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Agricultural Outlook Forum 1999



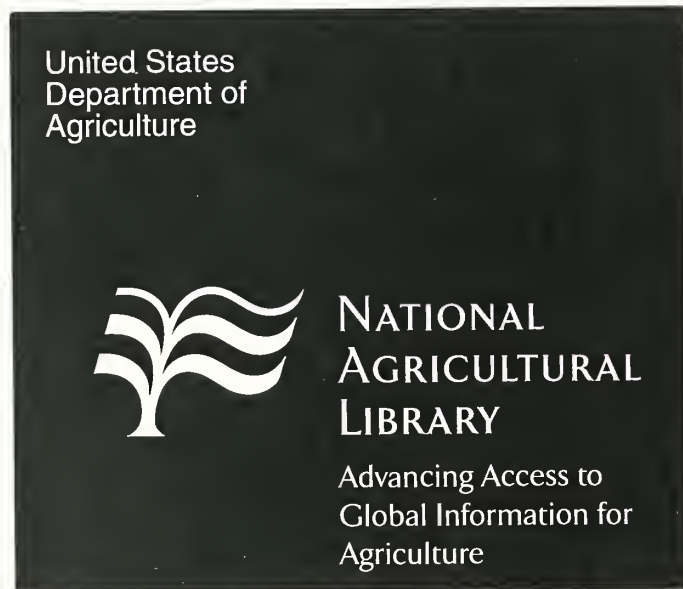
PROCEEDINGS

Presented by the U.S. Department of Agriculture
February 22-23, 1999
Arlington, Virginia

SPONSORING AGENCIES

The Outlook Forum is jointly sponsored by these agencies of the U.S. Department of Agriculture:

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Agricultural Marketing Service
Animal and Plant Health Inspection Service
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Farm Service Agency
Foreign Agricultural Service
Grain Inspection, Packers and Stockyards Administration
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PREFACE

In 1923, the U.S. Department of Agriculture first invited farm economists to Washington to discuss prospects for the coming year and provide farmers with helpful planning information. Three-quarters of a century later, despite the omnipresence of agricultural information and the ease of accessing it electronically, USDA's Outlook Forum tradition remains a vital one. On February 22 and 23, 1999, more than 1,100 people took part in Agricultural Outlook 1999, making it the best-attended Forum in recent years.

The proceedings include most of the presentations made at the Forum. Speakers included government, industry, and academic experts, and a number of farmers who provided an invaluable first-hand perspective.

Two themes emerged among the many topics covered during the meeting. One was concern with the immediate agricultural outlook in light of low farm prices, and prospects for recovery. The other was the actions producers have taken to manage risk and to capture a larger share of value by marketing what they produce. Topics of current interest discussed this year included agriculture in China and Latin America, forthcoming trade negotiations, the potential of precision farming and biotechnology, the impact of nutrition guidelines and nutrition programs, farmland preservation, and the new Census of Agriculture.

USDA also released a new set of long-term projections at the Forum, *USDA Agricultural Baseline Projections to 2008*, WAOB-99-1. The report can be ordered from ERS-NASS at the address noted below or obtained on the Internet at: <http://www.mannlib.cornell.edu>; search for "agricultural baseline projections" or item 94005.

All sessions of the Forum were recorded on audio tape and may be purchased using the order form in the back of this volume. The speeches and visual presentations presented here also are available on the Internet at: <http://www.usda.gov/oce/waob/agforum.htm>. Additional copies of this proceedings may be ordered from ERS-NASS, 5285 Port Royal Road, Springfield, Virginia 22161; phone 1-800-999-6779 or (703) 605-6220.

For more information about this volume or the Outlook Forum, call 202-720-5447 or contact rbridge@oce.usda.gov.



GERALD A. BANGE
Chairperson, Outlook Forum Program Committee

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OPENING REMARKS

Deputy Secretary of Agriculture Richard E. Rominger

Good morning. It's a pleasure to welcome our distinguished speakers, panelists, and international guests to the annual Agricultural Outlook Forum. I am Deputy Secretary of Agriculture Richard Rominger.

Speaking for Secretary Glickman and USDA's World Agricultural Outlook Board, we're delighted to have you with us as we open our 75th conference and what may be one of the most comprehensive and exploratory outlook forums ever.

Each forum is a barometer of its own times. If the sessions of these two days are an indicator, this is an agriculture in transition. Leading USDA through this change – some of it the most historical in half a century – is a man who's dedicated his career to public service. Will Rogers once said that "A man makes a living by what he gets. He makes a life by what he gives."

Dan Glickman has given more than two decades to public service -- 18 years as a Representative from Kansas to the U.S. House of Representatives and almost four years as Secretary of Agriculture. And he does the people's work at a fast pace.

Just since the start of 1999, Dan Glickman has been to Russia to work out food assistance agreements and to South Africa to discuss issues needing strong bilateral cooperation. He's studying risk management issues ... and working with Vice President Gore on a more efficient loan program for America's farmers and on proposals to curb urban sprawl. He's given USDA the go-ahead to permit irradiation of meat to improve food safety, and intensified efforts to reduce hunger in America.

Ladies and gentlemen, this is a man who sees agriculture's big picture. He loves to talk about it, but, more important, he's always ready to listen and then do something about it – it's my pleasure to introduce Secretary of Agriculture Dan Glickman ...

Thank you, Secretary Glickman.

Before turning to our keynote speaker, I want to call to your attention the fact that, as of this moment, the annual outlook conference is three-quarters of a century old.

When USDA and Secretary Henry Cantwell Wallace first invited prominent national economists to discuss prospects for the year 1924, they thought solid information would help level the playing field for producers and buyers. Seventy-five years later, that's still the general idea. In this last outlook forum of the 20th century, we're still grappling with the question of balance between buyers and sellers. And we're still reaching out to the nation's top experts -- from farmers to industry -- to shed light on the issues confronting this vast, complex business.

Among those experts this year are our keynote and dinner speakers. We're honored to have former Secretary of Agriculture John R. Block as our keynote speaker this morning. And this evening C. Fred Bergsten, Director of the Institute for International Economics, will discuss prospects for the world economy, a topic concerning all of us in agriculture.

In many ways, these two days will paint a picture of a changing and somewhat unsettled contemporary agriculture. Many developments are revolving around a constant core of markets and the need for market information.

As always, we'll provide farm and trade prospects. We'll look at upcoming trade negotiations, as well as global competition and developments in other nations – like infrastructure and biotechnology.

We have sessions designed to provide some understanding of the circumstances producers are operating in and how they're reacting to agriculture's structural changes. You'll note a heavy emphasis on issues that tell the story of an agriculture in flux – issues like marketing strategies for the new millennium, price discovery in an industrialized agriculture, concentration, integration, genetic modification.

Changes like these demand lots of questions and thought, and we're heading into that kind of analysis in these two days.

If this business is reorganizing, how are farmers dealing with it? Freedom to Farm may one day make the concept of a guaranteed price a 20th century anachronism. Our panels and speakers will examine farmers' methods for adapting. On the eve of the new century, many producers are calling up old-fashioned resourcefulness to market their products.

Farmers aren't simply accepting top-down structural change. Individually and collectively, they're coming up with innovations of their own to hold onto more of the bottom line. In this high tech age, they're looking at everything from farmers markets -- low tech and localized -- to new generations of co-ops and innovative slants on risk management and insurance.

To do justice to the range of subjects determining agriculture's well-being, we've expanded the number of agencies co-sponsoring this conference. And we have several "firsts."

This year, for the first time in many years, we're dedicating several sessions to nutrition, highlighting the connection between diet, dietary guidelines and farmers and their economics. Also for the first time, panelists will discuss the subject that will make future production possible – and that's the health and preservation of our farmland.

And we'll probably do a little bragging in the session on the 1997 census of agriculture. That census was released just two weeks ago and was the first carried out exclusively under USDA's roof – and, I might add, we released it 10 months earlier than ever before. We included aspects of agriculture that make it unique. Doing the job right for this highly important five-year benchmark will mean more defined information to portray a very different agriculture... an agriculture we'll get a glimpse of this week.

Leading us into these discussions is a true Renaissance man who, in the course of his career, has been a farmer, soldier, administrator, and Cabinet officer. From 1981 to 1986, John R. Block served as the 21st Secretary of Agriculture. Reflecting his commitment to open world markets to U.S. products, he visited more than 30 foreign countries.

Before that appointment in the Reagan Cabinet, he was Director of Agriculture for the state of Illinois. Today he serves in another distinguished capacity, as President of Food Distributors International, representing wholesale grocers and food distributors.

Mr. Block was born near his family-owned farm in Illinois. He graduated from West Point, served as an airborne infantry officer, and returned to Illinois to form a farming partnership with his father. That farm is now run by his son.

Mr. Block serves on several corporate boards, is on the board of directors of the U.S. Friends of the World Food Programme, and is a recipient of the Horatio Alger Award. Ladies and gentlemen, please welcome our keynote speaker ... John Block

REMARKS BY SECRETARY DAN GLICKMAN
1999 AGRICULTURAL OUTLOOK FORUM
ARLINGTON, VA -- FEBRUARY 22, 1999

Thank you, Rich, for that kind introduction. But more importantly, thank you for your deep commitment to American agriculture, both as a public servant and as a farmer yourself. Thanks also to Keith Collins, USDA's Chief Economist, and his staff. They've done an outstanding job putting together this conference...just as they do every day throughout the year.

It's an honor to meet with this group for the fourth time during my tenure as Secretary of Agriculture. It's great to look out and see so many friends, partners, and constituents. This is perhaps the year's most important and most complete gathering of agricultural interests, and it's something I always look forward to. I'm grateful that one of my predecessors, Jack Block, could join us today. It's a pleasure to see him in person...and not just his portrait, which I see every day in the lobby at USDA headquarters.

I've always looked at the Agricultural Outlook Forum as my State of the Union address. However -- and you'll be glad to hear this -- my speech will be reasonably short. And neither Sammy Sosa nor Rosa Parks is seated in the gallery today. Unfortunately those aren't the only ways in which my message this morning will be different from the President's last month.

The President was able to report a national economy growing at a rate unprecedented in peacetime America. Every conceivable economic indicator is pointing in the direction it should: 16 million new jobs since 1993...the highest homeownership in history...the lowest interest rates in a generation. The deficit, a national albatross that we carried around our necks for nearly two decades, has been wiped out. For the second year in a row, the President has submitted a balanced budget...the first time that's happened since I had a full head of hair. Instead of wringing our hands about the deficit, we're having a debate about what to do with the surplus. That's an extraordinary turnaround.

But while the national economy has boomed, it has been a year of struggle and hardship in parts of rural America. There's no point in trying to put a shiny gloss on it...no point in playing games of spin and denial. The facts are the facts.

And there will be a lot of facts presented over the next two days. A lot of statistics and charts from analysts, economists, and prognosticators of every stripe. So I'm not going to bombard you with prices, productions, and exchange rates. You'll hear plenty of that. I'm here to offer some positive, constructive realism...to tell you what it all adds up to and what we're trying to do about it.

We need to understand the farm crisis on an emotional -- as well as an intellectual -- level. We need to understand that behind the numbers there are real people feeling very real pain. Families who have been in farming for generations -- men and women who know no other way of life -- are finding their farms on the auction block and their lives turned upside down.

I get letters from these people every day. These are the kinds of things they tell me. One farmer

writes: "For many, agriculture is a family's main income. What's going to happen when farming doesn't pay off anymore?" Another farmer sees a bleak future, pointing out that "there...is no incentive nor stability for a young person to enter this profession."

And a young farmer writes: "My grandfather was a farmer; my father is a farmer; and farming is what I was taught as well. I am willing to make sacrifices, but should I have to give up farming just because I have one bad year? It doesn't seem fair."

No, it doesn't seem fair. And this is the part that's most unfair: this crisis is largely beyond most farmers' control. The whole thing flies in the face of the American promise that the hard-working and the industrious will be rewarded with a secure livelihood. Our farmers are as skilled and diligent, as intelligent and educated as ever...but many are rendered powerless in the face of harsh weather, increased world production, and a global economic slump that has depressed consumer demand in key markets.

I wish I could say we're about to turn the corner, but the fact is we're looking at continued large surpluses and weak demand in the near-term. Later today, USDA's Economic Research Service will release its baseline projections for the next 10 years. And they don't look very good.

That's not to say that these forecasts are etched in stone. The truth is they're not even traced in sand. Markets do have a way of unexpectedly turning around. There's still a high degree of uncertainty about the future, particularly anything longer than two or three years out. Nobody -- not even our USDA economists -- has a record of perfect prediction. In fact, in the mid-90s, it was generally believed that the good times would last forever, and that was one of the premises behind the 1996 Farm Bill.

The bill did include some strong provisions on trade and conservation. But it was a bill written for a bullish farm economy...of strong prices, good weather and fertile export markets. It offered limited protection for when the going got tough.

When the bottom fell out, I'm proud to say that the response of USDA and the Clinton Administration was quick and decisive. We don't have the authority we had before the 1996 Farm Bill, but we were not going to let farmers go into free fall without some kind of cushion. When it came time to deliver emergency relief last year, Congress came through with about \$4 billion. The President drove a hard bargain, used the power of the veto pen, and was able to increase the package to \$6 billion.

Total fiscal 1999 farm assistance comes to \$18 billion, the highest it's been since 1987. We are making \$50 million in direct payments to pork producers, who began to feel the price pinch only after last year's emergency bill. On top of that, the \$129 million of pork we bought for the school lunch and federal feeding programs was a Department record. We launched an \$80 million initiative to buy hog herds infected by pseudorabies. And we will do everything we can for other commodities in crisis as well.

To support agricultural trade, we extended export credit guarantees worth about \$4.5 billion in 1998. And we are shipping nearly 10 million metric tons of food to hungry people around the

world...an act that is as humanitarian as it is pragmatic. We will not back down on our efforts to move commodities to overseas customers. We will not back down in an effort to remove trade-distorting subsidies and barriers wherever they occur.

We are committed to helping our farmers and ranchers by continuing to use our full authorities under all of the statutes we administer. But the fact is the 1996 Farm Bill took away many of the tools that were available when Jack Block was Agriculture Secretary. We no longer have the ability to control production when demand falls. In the past, I have asked for the authority to extend commodity loans, uncap those commodity loans, and seek set-aside authority in limited circumstances. I am once again calling on Congress to work with me to meet these emergency circumstances that farmers and ranchers are facing.

In the meantime, we've got to be creative about ways to help our farmers. I recognize that there are ideological differences on the means to improve the farm safety net. But as the President emphasized in his State of the Union address, we must work in a bipartisan spirit to enhance and improve the farm safety net. That means taking a more preventative, pro-active approach, so that the programs are already in place when the crisis hits.

Don't get me wrong -- last year's emergency supplemental had to be done. But lurching from one expensive ad hoc relief bill to the next is not the best or most cost-effective way to protect farmers. What we did was try to build the safety net as the trapeze artist was falling. That's not really a safety net at all. It's more like damage control.

Taking the metaphor one step further, I might argue that it's not really about a safety net per se. Rather than catching people as they fall, let's give them a little extra resin so that they don't lose their grip in the first place.

We began to do that, by earmarking \$400 million from the 1998 emergency relief package for a down payment on crop insurance reform. This step will increase participation by reducing farmers' insurance premiums by 30 percent. That's one of the key things we need to do to strengthen the safety net.

I have also put forth some specific proposals that will build on that initial step and strengthen our existing crop insurance program. We need to make crop insurance more affordable, especially at the buy-up levels. We should develop policies that cover multi-year losses as well as single-year losses. We should expand the range of insurable crops. We should expand revenue insurance as an affordable option to more farmers. And in that context, I would also like to see a pilot revenue program for livestock -- because the largest American agricultural sector should be able to stand under the crop insurance umbrella as well. And we need to bring these products to market as quickly as possible.

Crop insurance will continue to be the centerpiece of the safety net, but we can be more creative in our thinking. We are looking at all kinds of new ideas, like extending due dates on market assistance loans to ease cash-flow pressures on farmers. We should also help finance on-farm storage facilities, thus allowing farmers greater flexibility in determining when to sell their product. Given the market demand that's out there, the private sector should also be stepping up

to the plate with new risk management tools. The states, many of them with large budget surpluses, also have a role in this area, and they are getting involved as well.

These are just a few thoughts. I know there are others out there. And most of them aren't emanating from inside the Beltway. Barry Flinchbaugh is with us today. He leads our 21st Century Commission on the Future of Agriculture, which we hope will make specific suggestions on what follows the current piece of legislation.

In the meantime, I'm taking this issue directly to the places where it means something in people's lives. In the coming weeks, Deputy Secretary Rominger, Under Secretary Schumacher and I will hold regional forums around the country to hear ideas from everyone who has a stake – farmers, ranchers, bankers, elected officials – about how we can strengthen the farm safety net.

There is no question that the kind of comprehensive safety net we're talking about will be expensive. But we will work with Congress to find the money. And I am confident that we will find the money, just as we have in the past. We can't afford not to.

There are a lot of other things that we're doing at USDA to lay the groundwork for a competitive farm economy in the future. We continue to work aggressively to open world markets to our agricultural goods. We are standing up to countries who try to mask protectionism in phony science. Brazil is now accepting TCK wheat. Canada is softening on its livestock import restrictions. And we will continue to be resolute in our dispute with the EU over beef, insisting that our hormone-treated cattle have stood up to scientific scrutiny and insisting that the EU honor the May 13 deadline to allow our beef into their market.

Our new science-based meat inspection system is making our food safer...and therefore more marketable. Our fiscal year 2000 budget includes the first substantial increase in research dollars since 1992. And our Farmland Protection Program is helping curb the sprawl that is throwing up cul-de-sacs and strip malls where once farmers raised corn and planted soybeans. We're not anti-development, but when you consider that we're losing 50 acres of farmland every hour of every day, I don't think it's unreasonable to put some emphasis on what Vice President Gore calls smart growth. With all due respect to our hosts here at the Marriott, I don't think we want the whole country to look like Crystal City.

Even as we deal with the immediacy of the farm crisis, we have to look further on the horizon. Radical, structural economic changes are presenting a future of challenge and uncertainty for the American farmer. I don't think we should just accept the changes we're seeing -- we have to ask the tough questions. Instead of letting change happen, we ought to be thinking about how to adapt to change...how to help farmers and ranchers adapt to change...and perhaps how to control some of its excesses.

For example, we believe that biotechnology is critical for feeding a hungry world in a responsible and sustainable fashion. But rapid innovation in biotechnology brings with it troubling questions: who owns what? Does a farmer own a seed if he buys it? What about the company that invested in the science and conducted the research that led to a successful crop? How does government respect the proprietary rights of the company without hurting the small farmer? Is there any room for common ground? What role should public research play in the ag economy of the future? Are

we doing enough to preserve seed diversity and germ plasm for the public? These questions must be given much greater thought as we enter the new millennium.

We have to address the changing structure of agriculture. That's why I appointed both a Commission on Concentration and a National Commission on Small Farms, the first time USDA has brought experts together to examine these issues.

It would be simplistic to say that consolidation, on the whole, is a good thing or a bad thing. Consolidation can lead to more efficient, lower-cost production. But competition is the lifeblood of the free enterprise system, and the fewer options available in the marketplace, the less innovative the economy. What's more, we should all be concerned when the trend toward larger and fewer agricultural operations threatens to drive the small operator out of business. We can't allow a system of agricultural Darwinism to prevail, with the survival of the fittest becoming survival of the largest.

Consider the implications of consolidation in the new contract-oriented farm economy. Contracting can be a good deal for the farmer, as it helps protect him or her against fluctuating markets. But as processing and wholesaling and agricultural input become controlled by fewer and fewer players, the producer can lose the ability to shop around for the best deal and has no choice but to accept lopsided contractual terms. The large interests gradually seize the bulk of the revenue and the management control, and the worry is, as Professor Neil Harl of Iowa State University recently put it, that American farming could end up being reduced to nothing more than a generation of tractor drivers.

Partly in response to consolidation and contracting, we're seeing a rise in co-ops, with farmers banding together to give themselves more leverage in the marketplace. Should the government more actively encourage co-ops, with offers of technical and financial assistance, in order to offset the influence of larger operations? How do we protect farmers from being discriminated against when they join co-ops? The statute designed to offer such protection -- the Agricultural Fair Practices Act -- has enforcement procedures that are cumbersome and difficult to apply. That's why we asked Congress to fix the statute last year, and we will do so again.

We also need to ensure that farmers and ranchers have access to all relevant information about price and supply conditions governing their purchase and sales practices, particularly in the livestock industry. Information is power, in agriculture as in everything else. We are currently working feverishly to find the best ways to make that information available to producers, as well as to the Congress and USDA.

We need an intellectual debate that tackles all of these questions. Too often, I think, the dialogue on agricultural issues is all trees and no forest. We're preoccupied with this regulation or that particular piece of legislation. Meanwhile, macroeconomic change whizzes by, and we don't have an appropriate response.

We need a debate about what the role of government will be in this new landscape. The question of what government can and should be doing for agriculture is wide open. From the Depression right up until the 1996 farm bill, in most cases, the government role was clearly defined. Above

all, it was to shield farmers from low prices with income and price supports.

That really was a unique relationship enjoyed by no other sector of the economy. For the last 60 years, ensuring that we have a strong, diversified, production agriculture has been a matter of national interest. It wasn't always a blessing to have the government in your hair telling you what and when to plant. But it did offer protection, and it also gave us the cheapest and most abundant food supply in the world. In fact, we're one of the few countries that has never gone to war over a shortage of food.

We're trying to find a balance. We want to let farmers run their own businesses, and we will. But we can also be a constructive partner, who is there to protect their downside...who helps them cope when prices head south. How can we be helpful without being intrusive? How do we respect markets and at the same time correct their inequities? When does laissez-faire become out-and-out neglect?

I realize that I'm asking more questions than I'm answering. That's because there are no simple answers. We're going to have to work together toward some consensus. And I hope that this conference will provide the opportunity to start moving toward that consensus...to start looking beyond the minutiae of supply and demand ratios to the outlook for the fabric of the American farm and the future of farm policy. It's not too soon to start laying the groundwork for the next farm bill.

Of course, any consensus will be a long time in the making. And in the meantime, we are in the middle of a crisis that shows no signs of abating for many producers. We are losing farmers at an alarming rate. For many people, there may not be a long-term if we don't do something in the short-term.

I am here to tell you that we are not going to just stand there and watch the air run out of our farmers' parachute. We are not going to leave them to navigate this rough economic terrain completely on their own. If prices continue to plummet, if exports continue to dry up, if Mother Nature shows no mercy...we will be there. But, as you know, we can't do it without Congress, and I expect them to be there as well. We can't guarantee anyone anything. But we can ensure that a caring government will do what it can.

We've been there every time in the past. We were there in the 30s, when the Farm Credit Administration and the Commodity Credit Corporation were established, and we will be there again with the additional credit farmers need when cash flow becomes a problem. We were there when the Depression devastated American agriculture. We were there during the farm crisis of the mid-1980s. And we will be there again.

What's at stake here -- with both our short-term and our long-term challenges -- is nothing less than the future profitability of family farming. If we don't respond to contracting farm income and wildly volatile markets...if we don't build a strong safety net...if we don't address issues regarding the structure of agriculture...this is what farming could look like in the middle of the 21st century: mega-farms, on the one hand, and hobby-farming on the other -- men and women who farm on the side while earning their living doing something else. I don't think it's a good idea to

let farming become stamp collecting.

The case for preserving family farming goes way beyond economics. If you let that tradition be extinguished, you cut out a piece of the American character. Franklin Roosevelt got it right when he called the American farmer "our ideal of self-reliance and spiritual balance – the source from which the reservoirs of our nation's strength are constantly renewed."

It was another president, born 267 years ago today, who represented that ideal. George Washington was a skilled general and a natural political leader. But soldiering and statesmanship were, to him, obligations. Farming was his passion. The Father of our Country wanted nothing more than to repair to Mount Vernon after the Revolutionary War, but he assumed the presidency with what he called "the most unfeigned reluctance."

Now, I know that the world has changed. We shouldn't become lost in nostalgia because agriculture will never again be like it was in the 18th century, or even 40 or 50 years ago. We won't ever again have the proverbial 40 acres and a mule. But today, on George Washington's birthday...here in his home state...just across the river from the city that bears his name...just a few miles down the road from his farm...let's commit ourselves to preserving the best of the agrarian tradition that he represented -- a tradition older than our democracy, older than our Constitution, older than our nation itself. Thank you.

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REMARKS TO THE USDA OUTLOOK FORUM

John R. Block

President, Food Distributors International

Thank you very much, Rich. Indeed, our work in agriculture goes back many years. There were a lot of exciting and good times, and many difficult and tough times.

Ladies and gentlemen, I am honored to speak to you today. I have given many, many speeches over the years, since I served as Secretary of Agriculture.

But it's a special honor to be back and speak for the U.S. Department of Agriculture, a great institution, staffed with dedicated, honorable, hard working public servants. It's the best team in town, as far as I'm concerned. I always felt that way. And that is reenforced as I sit here today, and as I listened to Secretary Glickman speak, and to the questions and the concerns of people connected with agriculture.

It brings back a few memories, because we've seen tough times before, and it is quite obvious that Secretary Glickman is struggling to find answers to problems that don't have any easy answers, as he pointed out.

I was asked today to relate the current situation in agriculture, and the policy changes that we face today with some of those that we faced in years past. And I will just say that the past is never the same as it is today. And today is not going to be the same as it will be in the future.

When I grew up on a farm in Illinois, and I was just a little guy, they'd be putting up hay and my father and the other men would be talking. They talked about, after the end of the day, the County Fair or the 4-H show, or the St. Louis Cardinals and the Chicago Cubs. They didn't discuss about exports to the Soviet Union, or an Asian crisis, or how we are going to sell all of our farm products. These things just were not on the radar screen then.

We had two old horses that pulled a two-row corn planter. Today, we have a 24-row corn planter pulled by a big tractor. My father could pick 100 bushels of corn in a day. Now, my son picks and shells 100 bushels of corn in seven minutes.

We raised 300 pure bred Duroc hogs. Durocs, as you know, grow faster on less feed. That's what we said. When I was Secretary, my son and my father were raising 6,000 hogs. Well, now my son is raising 15,000 hogs. And the farm grew from 300 acres when I was a little guy, to 4,000 acres today.

We used to take our hogs to the market, and whatever the price was, that's what we'd get. Today we sell them on grade and yield. I mean, the consumer wants a certain kind of hog.

I have pictures in my study, and before that I had them in my office when I was Secretary, of my dad with a grand champion Duroc boar, it's the fattest animal you've ever seen. And I've got a picture of me with a pretty fat Duroc gilt, another champion.

Then there is a picture of my son with a grand champion Poland/China boar--as lean and as hard as you can imagine. And they are even better today. The changes in agriculture are all around us. And the structure of agriculture continues to change right before our eyes. It's moving target that is going to continue to move.

The role of government in agriculture has changed. As Secretary Glickman pointed out, we just have to try to figure out what is Government's appropriate role in agriculture today, and

what it should be tomorrow.

When I came in as Secretary of Agriculture, we had relatively high-priced supports, and we were accumulating grain by the millions of bushel. The government ended up owning the grain. We had set-aside programs to try to get the grain surplus down, and ultimately we used export subsidies to push it into the foreign markets and compete with the Europeans.

Those were tough times, but the first problem I faced was a Soviet grain embargo. All the farmers were up in arms all across the land because they had grain to sell, and they couldn't sell as much. They would pay for it. The Soviets paid them cash on the barrelhead for everything. Today, you have to give it to them. That's another change.

We introduced the payment in kind program, because we had way too much grain. This was a creative idea. What do you do with all the grain? How do you cut production? How do you get the prices up? We just gave the grain to the farmers. In turn, the farmers cut production by a specific amount. They had to do that, or they wouldn't be given the grain.

Of course, they took the grain. So we wiped out the surplus, the prices came up. We had a drought that year, and God joined the pick program too. And we solved the problem. It was a temporary solution, because obviously the surplus returned.

Later on, we had too many cows giving too much milk. So we created the whole herd dairy buy-out program, where we paid farmers to send the cows to market. We made all the beef people angry, but the dairy people were happy. We fixed that problem, too.

I was relating that solution to my son here a few weeks ago, and he said, "Dad, have you ever thought about having the whole herd hog buy-out program?" Now you are doing it.

Export subsidies? We didn't have them when I was first there, and the Europeans were eating our lunch. I couldn't get clearance to do this, but finally I worked a deal with the Office of Management and Budget and Director, David Stockman, and we were able to develop an export subsidy program. We announced it down at the Senate. Senator Dole was there, and other Senators. It was bipartisan, and everybody was going for it. We're going to take those Europeans on and fight fire with fire.

I went to Cabinet meeting the following Monday, and Secretary of State George Schultz came in. When the meeting started, he got red in the face and he pointed a finger at me. "Now you've done it," he said. You're subsidizing exports, and the Europeans are all going to be angry. "How can we work with the Europeans in the future?" On and on and on.

I just said that I got it cleared at the White House—that the President approved it. But he said, "I was over in Saudi Arabia. You didn't talk to me." Well, you know, everything is not always harmonious in government.

But we got that done. And that was beginning of the export subsidy programs, that we use when we need to. Maybe we don't use them enough, but we do use them.

The Conservation Reserve Program, which was discussed here, is a staple today for American agriculture. We didn't have it. In '81 when we wrote the farm bill, I talked about it and people on my staff even said, "Forget it—nobody is interested in taking land out of production and buying it for conservation purposes. Forget it."

But I continued to talk about it. And by the time we wrote the '85 farm bill, I put it in our plan. And I took it to the Cabinet. I got shot down. There were a few people who didn't want a new program, but I still kept it in my mind.

The Spring came along, and we found a little money here, a little more money there, and I concluded we had enough money to pay for it, to get it started. So I decided to announce it. So, I flew to Indianapolis, and was prepared to announce it the next day on Senator Luger's farm.

I got a call that night from David Stockman. "I understand you are going to announce the Conservation Reserve Program," he said, "It is not authorized." I said, "Listen, you're too late. Senator Luger is here with me. We're going to announce it tomorrow." And we did. That's when it started. And I never heard another peep out of David Stockman after that.

There are a lot of similarities about the problems we face today. There are global surpluses. Some of our customer countries are in recession, just like back in my days as Secretary. Still we see the export market as our single best hope, although as the Secretary points out, there must be some other things, too.

We launched the Uruguay round of trade talks in 1986. We're looking at going forward with trade talks again this year, but there are some significant differences, too. We're not as quick today to jump in and use food as a weapon.

When the Soviet grain embargo was implemented, President Ford embargoed soybean shipments, too. There again, he was using food. Food is used as a weapon right now in some other countries, too. There are several bills in Congress right now to put a stop to that. I hope they pass. It is a proper thing to do, both for our farmers, and for countries that might need to buy food.

Farm debt today is not nearly as great as it was in the mid-80's. We paid some of it down over the years. The value added market for farm products is our big export market. It's bigger than the bulk produce market. If you go back in the 80's, the bulk product market was a larger side of the equation.

And Secretary Glickman, as he points out, probably doesn't have the authority to do some of these creative things that we did. So we'll have to wait and see. I also say that some of the creative things that we did probably wouldn't work today because of the global market atmosphere that we're in, more so than 15 years ago or so.

Finally, we're in a consumer-driven market today. I just pointed out the grade and yield selling of hogs. You know that grocery stores are emphasizing all ready-to-eat food. Plus, the whole distribution chain from the farmer to the consumer has been speeded up. Now the consumer is calling a lot of the shots. He or she spends about 15 minutes preparing a dinner today. Back in the 70's She--mostly--would spend as much as two hours on a dinner.

With all of this, I am concerned that we are losing family farms. Those are your concerns too. We are losing family businesses. I don't think we can tamper with things a lot. We believe in the market system, and free enterprise. But there is one thing I think we ought do. The government should not be a party to destroying family businesses. And I think it is because the government effectively confiscates family businesses whenever the owner father dies.

Now, I see supermarkets and small businesses all around me. Either they have the government effectively force them out of business with the estate tax and death tax, when the owner dies, or else they will sell before death, just to avoid that. And the family business is gone and it is owned by some big corporation.

Why this non-American tax stays in place, is beyond me. It is time to get rid of it, if we want to save family businesses.

The second point that I'm concerned about is the pressure to interfere with prices. And I know we are trying to fix things, but high loan rates don't fix things, frankly. They just make it worse. I like the set asides and the conservation reserve if we are actually conserving soil and doing the right thing there.

But the old set-asides, the way we used to have them, that's not efficient, to take some of the best land in the world out of production. This didn't succeed, and I'll tell you, I tried to fix

the crop insurance programs, we're still trying to fix them.

I called in the experts from the insurance industry, and tried to push them. But, it didn't get fixed. And it is not fixed today. Good luck in trying to fix it. I'm not saying to get rid of it. I'm just saying, it is a very imperfect solution. Revenue assurance is another one. Maybe we can make it work, but I'm afraid that will become an imperfect solution, too.

The third concern I have is the growing trade protectionism sentiment in this country. I don't think it is going to take over, but we should guard against it, because exports are our future. There is progress. There are driving forces of change. New technology has driven us to bigger farms and bigger businesses. It has made possible big combines, big tractors, computers.

The global economy continues to open up opportunities for us. Another point, the sophistication of our industry and the global realities have made it possible to reduce government's role in agriculture. They have. We are more sophisticated than we were, and the pressures of the global marketplace changes a lot of things.

Finally, there is a lot of concern for the environment, providing a strong underpinning for our Conservation Reserve Program. I think it is a good program. It also encourages us to use a lot of new tillage practices, to conserve soil, and save soil. Those are driving forces.

We are on the threshold of an amazing biotechnology era, the introduction of genetically engineered agricultural products that will prove to be more powerful than any of the former technological breakthroughs in my judgment; more powerful than hybrid seeds; more powerful than commercial fertilizers, and more powerful than pesticides and herbicides.

I have a lot of faith in the private enterprise system, and the market economy. I close with a quote from Winston Churchill. Some regard private enterprise as a predatory tiger, to be shot. Others look at it as a cow they can milk. Only a handful see it for what it really is, the strong and willing horse that pulls the whole cart along.

Churchill also says, "capitalism is the unequal distribution of wealth. Socialism is the unequal distribution of misery." In the real world, there are winners and there are losers. But we have the best system in this country of any other, and we're going to continue to look forward to the future with optimism. Thank you.

OUTLOOK FOR THE FARM ECONOMY

Keith Collins

Chief Economist, U.S. Department of Agriculture

Over the past couple of years, this session of the Forum has been devoted to presenting a brief overview of the U.S. farm economy in the context of world developments and a discussion of how USDA policies and programs are operating in connection with the farm economy. Today, we will again follow that outline. I will provide the overview of the farm economy, and Under Secretary Schumacher will discuss trade, policy and program developments.

A Change in Climate

During 1998, the outlook for U.S. and world agriculture changed sharply. At home, bad weather devastated many regions, stretching from California to Florida. Abroad, the Asian financial crisis and rising world commodity supplies reduced farm prices and the value of farm exports. In reaction, increased U.S. government assistance to farmers was enacted, totaling nearly \$6 billion, and that is helping to maintain farm income and limiting financial hardship for many producers. Unfortunately, exports and prices will probably be lower in 1999, causing increased farm financial stress, particularly in regions that up to now have weathered the downturn in the farm economy, such as states in the corn belt.

But, agriculture is a cyclical industry, and it will not stay deep-in-the-red forever. Over the next 2-4 years, economic recession in a number of countries should give way to economic recovery, lower prices will reduce agricultural production, somewhere weather will create problems, and demand for U.S. agricultural products will rise, bringing stronger farm prices and incomes. At this point, however, this recovery looks like it will occur at a very gradual not rapid pace.

I want to emphasize how important the global economy is to U.S. agriculture. In 1996 and 1997, strong world economic growth and lower trade barriers helped push U.S. agricultural exports to a record high \$60 billion in FY 1996. Since then, growing world production and weakening world demand have hurt U.S. exports. Grain, cotton, beef, and poultry exports have all been seriously affected. In 1998, our economy was strong, but the foundation of world demand deteriorated, as Japan, South Korea, Malaysia, Philippines, Thailand, Indonesia, Russia, Saudi Arabia and Brazil all saw recessions. In the boom, period of 1996 and 1997, the world economy grew 3.4 percent per year. In 1998, growth fell to 1.9 percent, and in 1999, we expect a further slide to only 1.7 percent.

The problems in Brazil are an important concern given the free fall of the real during January. For now, the currency has stabilized following the decision earlier this month to allow it to float. But the underlying problem of a large government deficit remains. Until this is addressed, Brazil faces high interest rates and slow growth. Brazil is the largest economy in

South America and its performance will affect the entire continent. At this point, indications are not optimistic for 1999.

As a result of anemic world economic growth and lower prices, U.S. farm exports are expected to drop to \$49.0 billion this year. That is down nearly \$11 billion from the peak in 1996. Exports to Asia account for over 80 percent of the decline in total export value. This drop in exports has given rise to questions like: Can't more aggressive use of GSM credit guarantees boost exports? Wouldn't elimination of trade sanctions help solve the problem? And, would full use of the Export Enhancement Program restore lost trade? The answer to these questions is no. GSM is being pushed to its limit, trade sanctions are having only a minor effect on our exports and the Export Enhancement Program, which is primarily available for wheat, would drive down world wheat prices making it a futile waste of taxpayers' money given the ample competitive supplies on the world market.

Aggregate Indicators of Performance

Given this somewhat pessimistic outlook with respect to demand for farm products, what are the implications for the overall health of the U.S. farm economy? Starting with aggregate cash flow, declining prices caused farm market receipts to fall \$10 billion to \$198 billion during 1998, and they are likely to stay at that reduced level this year, with crop receipts projected to drop again, and livestock receipts to rise with some improvement in cattle prices.

In 1998, and so far this year, declining interest rates, fuel prices and feed costs have helped reduce production costs, offsetting some of the decline in cash receipts. In fact, total production expenses declined 2 percent from 1997 to 1998, the first significant drop in more than a decade. And, they are likely to change little in 1999.

Direct government payments to farmers reached nearly \$13 billion in calendar 1998 and will probably total at least \$11 billion in 1999, again providing strong support. For the 1990's, government payments exceeded these levels only once, in 1993.

These figures portray an industry still financially performing adequately as it entered 1999, thanks to higher government payments and lower production costs. Those factors helped push net cash farm income for all of agriculture in 1998 to the second highest ever. And the farm balance sheet was fairly sound, as farm equity steadily increased through the 1990's, and the overall debt-to-asset ratio remained steady at about 15 percent, down from over 20 percent in the mid-1980s.

But, these aggregate figures mask a marked erosion in market income in many regions and commodity sectors, and all signs now point to higher farm financial stress in 1999. Net cash farm income is currently projected to decline \$3-4 billion. While U.S. farm real estate values may rise slightly, land values began declining in a number of Midwestern states during the last half of 1998. The drop in income, coupled with declining asset values for many producers, means many will find difficulty obtaining credit, and those who do obtain credit will use it for variable cash expenses, not investment, and will find themselves squeezed trying to repay debt out of current

income. For the many producers who struggled with cash flow in 1998 resulting from low prices and adverse weather, their problems will likely worsen in 1999.

Perspective on Several Major Commodities

I now want to comment on a few key commodities, which will reveal many of agriculture's problem areas and pose challenging questions for the year ahead.

Starting with **wheat**, in 1998/99, farm prices are expected to average only \$2.70 per bushel, the lowest season-average price in 8 years. We estimate carryover stocks on June 1 at nearly 1 billion bushels, the highest since 1988. The key outlook question is: Since wheat was the first major commodity to sink after the mid-1990's run up, will it be the first to start reviving? I think, Yes. The Farm Bill envisioned that planting flexibility would help reduce surpluses by causing a cutback in planted acreage when prices were low. This year is the first big test, and the test is being passed for wheat. For the 1999 crop year, the world wheat situation will be tighter with lower U.S. and EU production, so, U.S. wheat prices should rise, but with weak global demand and trade the price increase may be limited to the range of 10 percent.

For **corn**, total supplies in this marketing year are up sharply, and carryover stocks on September 1 are likely to be up nearly 500 million bushels from last year, to their highest level since 1993. USDA's corn price forecast of \$1.95 per bushel is the lowest in more than a decade. For the 1999 crop, even with a little less acreage, trend yields would push U.S. corn supplies up again. Total use should expand about the same amount, leaving U.S. corn carryover stocks near the same high levels as this season, making the 1999/2000 price outlook for feed grains about unchanged from this year.

For **soybeans**, U.S. supplies this season are record high, and we face strong competition from Brazil and Argentina. Carryover stocks on September 1 are expected to exceed more than 400 million bushels, the highest carryover in more than a decade. Soybean prices will probably average \$5.20 per bushel this season, the lowest since 1986/87.

The key outlook question is: can market forces stabilize or reduce stocks in 1999/2000, such as for wheat and corn? The answer is not likely. In fact, the Farm Bill provisions are causing the pain of grain surpluses to be spread to oilseeds markets. Producers are being drawn to soybeans like filings to a magnet because for the moment it appears to be the least worst alternative. A further increase in carryover stocks and lower prices are likely for the 1999 crop year. Soybean acreage is likely to rise at least 1 million acres, encouraged by the high marketing assistance loan rate for soybeans relative to other crops, benefits of herbicide-resistant soybeans, low out-of-pocket planting costs, and soybean's resilience in adverse weather. With trend yields, prices could average well below \$5.00 a bushel and marketing loan payments could be in excess of \$2.5 billion.

Turning to **cotton**, it may be the commodity most vulnerable to the world economic slowdown. Lower world demand for cotton textiles and apparel has resulted in the second lowest U.S. cotton exports in 20 years. The demise of the step 2 program has aggravated the export decline and will permit raw cotton to be imported. With a strong dollar and Asian textiles seeking

a home, since the start of 1997, the U.S. has seen a 20-percent increase in imported cotton textiles and apparel. Of the total cotton textiles and apparel Americans will buy this year, about 45 percent will be imported. Weak demand has reduced farm prices, despite the drought-reduced crop in 1998. In 1999, a return to trend yields would raise U.S. production but weak world demand could push U.S. ending stocks higher, placing additional pressure on cotton prices.

Turning to meat and poultry, we are in for another year of record-high production in 1999. For cattle, market prices eroded further last year, and averaged the lowest level in the 1990s. The continuing liquidation and record-high slaughter weights caused beef production to increase by 1 percent in 1998. We expect a 3-percent decline in beef production in 1999, but much of the year-to-year decline will not occur until the second half of the year. For all of 1999, fed cattle prices are expected to average \$65.50 per cwt, compared with \$61.50 last year, better, but still low.

Hogs have received much attention this year as prices for all of 1998 averaged a little below \$32 per cwt, the lowest since 1972. What was responsible for the drop: 10 percent more production? Constrained slaughter capacity? Imports? Mega farms? A rush to avoid environmental constraints? Answer: all of the above probably had a role. But the most important factor can be summarized by George Bernard Shaw who said, when asked for his thoughts about New Zealand, "Altogether too many damned sheep."

Continued large hog supplies will pressure prices during the first half of 1999. As hog slaughter begins to decline in the second half, prices should rise above last year's level, particularly by the fourth quarter. For all of 1999, USDA forecasts a slight decline in production and hog prices averaging \$34 per cwt., 7 percent higher than last year, again better but still low.

As beef and pork production are reduced, broilers will gain increased market share. The loss of the Russian market hurt broiler exports, but prices were still strong in 1998, and with lower feed costs, production will probably be up nearly 6 percent, and it is broilers that will push total meat and poultry supplies to record high levels in 1999.

While the milk industry awaits the final decision on Federal Milk Marketing Order Reform and the distribution of the \$200 million in relief bill funds, milk production is seeing its first sustained production increases since 1995. And, prices are coming down from the record-high \$15.38 average in 1998. For all of 1999, we expect farm-level milk prices to average about \$1 per cwt lower than last year--putting them about halfway between the 1997 and 1998 levels. Lower feed costs and high earnings of the past year should help producers through the price decline.

I can summarize my review by pointing out that many of my comments referred to "the highest supplies since..." or "the lowest prices since...". Such descriptors are not the hallmark of a strong economy. Our aggregate farm income estimates include a large, stable, and growing core of commodities that include fruit, vegetables, nursery and greenhouse products and broilers. And, this group's sales will trend up again in 1999. The sales of these commodities exceed the total value of hog and cattle sales. They exceed the total value of food grain, feed grain and oilseed sales. So, it is by looking beneath aggregate U.S. farm income that we find the greatest financial

strain in 1999 will be on field crops. We have calculated the average net income over the past 5 crop years just for wheat, corn, soybeans, upland cotton and rice. For the 1998 crops, net income will be 17 percent below the previous 5-year average, and for the 1999 crops, current projections show income 27 percent below the previous 5-year average. Livestock markets may get a little stronger, except for milk, but lower feed costs will help there.

There are many uncertainties that could affect these markets and the well-being of market participants over the next 1 to 2 years. Weather is always a key and could work to make the prospects better or worse. Another major factor will be the world economy. If the Asian economies fail to stabilize or the economic problems in Brazil spread U.S. agricultural exports could drop further. Right now, the engines of growth in the world economy are the U.S. and the EU, which are slowing. Should either of these two regions fall into recession there would be a global recession that would further erode world food and fiber demand and U.S. farm exports.

A final factor is China which has disappeared as a wheat importer and become a export competitor in corn and cotton. Production and policy change there is a great uncertainty.

Looking to the longer term, I call your attention to the *USDA Agricultural Baseline Projections to 2008*, a publication released at this Forum. This assessment provides USDA's view of how the global farm economy would unfold over the next decade under a very specific set of assumptions about policy and weather. This ambitious effort is primarily the work of the Economic Research Service. The projections are used by USDA for budget and policy analysis and planning. While we can be sure that the projections will turn out wrong—because the assumptions never hold—the analysis is extremely useful to understand the possible implications of the underlying trends as we now see them. A few highlights are:

- The global macroeconomy takes 3-4 years to recover to a stable, moderately strong rate of growth. The global economic problems mean a prolonged weakness in global demand for farm products.
- The slow recovery in the world economy and ample supplies in competitor countries results in U.S. agricultural exports not returning to the record level of 1996 until about the year 2003.
- U.S. planted acreage drops only a small amount, and with trend yields supplies remain large, leading to a slow recovery in nominal farm prices and steadily declining inflation-adjusted farm prices throughout the projection period. In particular, real soybean and hog prices decline substantially compared with other commodities.
- Recovery in the global economy leads to strong growth in U.S. meat and poultry exports after 3-4 stagnant to slow growth years. U.S. cattle production turns up for several years starting in 2001, but then declines under strong competition from hogs and broilers.
- Net farm income grows slowly and throughout the projection period does not reach the 1996 record high of \$53.4 billion. Loan deficiency payments are made through 2002.

- The farm balance sheet improves as the overall debt-to-asset slowly declines throughout the projection period in line with the slow declines observed during much of the 1990's.

In conclusion, slow world economic growth and abundant world food and fiber supplies will converge in 1999 to reduce the economic performance of U.S. agriculture. Americans will continue to benefit from ample high quality food choices with food prices rising only 2 percent in 1999. The purpose of this Forum is to explore the details of agriculture's performance and the implications for private sector decision making and public policy.

**Remarks by August Schumacher, Jr.
Under Secretary for Farm and Foreign Agricultural Services**

Agricultural Outlook Forum
February 22, 1999

Agricultural Trade and Domestic Farm Prospects
USDA Farm and Trade Programs Work Together for U.S. Producers

My colleague, Chief Economist Keith Collins, has given us an overview of what is likely in store for the farm economy. These will be challenging times for America's family farmers.

The current state of the farm economy is not what some had in mind when Congress passed the 1996 Farm Bill. Baseline projections for farm prices and exports were quite different in 1996 than they are today. Many in agriculture anticipated growing world demand and higher prices, with farmers maximizing returns with new planting flexibility. The theory was that foreign markets would drive growth and farmers would respond.

This morning, I intend to briefly focus on the theme of returning prosperity to the family farm:

- Expedite short term emergency assistance programs
- Strengthen the domestic safety net
- Rejuvenate Agricultural Exports and move from a residual to a competitive overseas supplier

It is extraordinary how rapidly events have changed since 1996. When the Farm Bill passed, farm prices were high. With strong commodity prices, record or near-record production for many crops, soaring exports and generous first-year AMTA payments, farm income had reached record levels.

From a budget standpoint, it appeared that farm program payments were capped and set to decline for a long period. What occurred instead was quite the opposite -- we ended up with nearly \$6 billion in emergency relief in 1998. Loan deficiency payments and marketing loan gains are approaching \$3 billion. CCC purchases of surplus wheat add to the total as well. All told, unanticipated government outlays will total nearly \$10 billion this year.

USDA's Baseline Projections

No one anticipated the severity or length of the global financial crisis. Last year's projections for farm exports didn't accurately gauge the degree of foreign economic contraction and the length of the recovery period for many of the world's economies. A year ago, USDA's baseline projections were as follows:

"The USDA baseline calls for robust growth in global import demand, driven primarily by income growth in developing countries and increasingly open trade environment. . . . Many developing regions, as well as the transition economies of Eastern Europe and the Former Soviet union, are expected to show stronger income growth during 1998-2007 than during the past ten years. . . . U.S. farm exports are projected to grow about 3.6 percent annually from the relatively high average during 1995-1997. . . . U.S. farm exports are projected to reach about \$63 billion in 2000 and \$84 billion by 2007."

I guess this proves the old adage "Don't put the fate of your business in the delusions of economists." [Peter Drucker]. Of course, economists are always better at telling you tomorrow why the things they predicted yesterday didn't happen today. We are still projecting long-term growth in exports, but this year's baseline projections are much more sobering:

- Today's baseline projections are based on 1 to 3 years of negative growth in crisis countries in Asia and revised estimates of import demand in China. They are also based on higher stock levels than anticipated previously;
- Today, we are projecting growth in U.S. agricultural exports will be slowed over the next 2 to 3 years by weakened demand with increased competition from other exporters such as Brazil and Argentina;
- U.S. agricultural exports are now projected to total only \$49 billion in FY1999. They are not expected to reach 1996's record high of nearly \$60 billion for another five years.

Still, longer term trade prospects remain relatively bright. Even at today's lower levels, farm exports still contribute significantly to net farm income. After all, 96 percent of the world's population still lives outside the United States and we still produce far more food than we could ever consume in this country.

Returning Prosperity to America's Family Farms

President Clinton articulated our challenge in his State of the Union Address when he said: "We must work hard to bring prosperity back to the family farm."

The question is, given these baseline projections, how can we best help family farmers become prosperous again? I believe we can strengthen the farm safety net without returning to the days when the government told farmers what to plant, when to plant, and where to plant. It strikes me that a number of measures are needed:

Short-term Emergency Assistance

At least in the short term, prices are too low for farmers to make a decent living without additional government support beyond what is provided for in the Farm Bill. Congress provided additional relief last year which producers across America greatly needed and appreciated. Every indication is that family farmers will need additional financial support again this year.

In FY 1999, CCC outlays are forecast at \$18.2 billion, 80 percent above outlays in FY1998. As a measure of the low prices, LDP's for the major commodities in FY1998 were under \$500 million, and in FY1999, they are projected to reach \$1.6 billion, more than a 3-fold increase. For FY2000, however, the LDP's are projected to be over \$2.7 billion, about 6-times the LDP total for FY1998.

After the President vetoed an earlier bill that provided less relief, Congress passed legislation providing an additional \$5.9 billion in assistance, including additional AMTA payments of \$2.9 billion--amounting to a 50-percent increase in 1998 AMTA payments (these were distributed to major crop producers before Thanksgiving); \$200 million in emergency payments to dairy producers (to be distributed this spring); a \$2.4 billion Crop Loss Disaster Assistance Program which includes coverage for single-year and multi-year losses (sign up started February 1), as well as a \$400 million down-payment on crop insurance reform to reduce farmers' premiums by 30 percent this year, as an incentive to increase the use of buy-up coverage, and to help energize a broad-based crop insurance program that will be the anchor for the safety net; and a \$200 million Livestock Assistance Program (LAP) (began last November, and has been extended due to heavy demand).

We have taken steps administratively as well to help family farmers. For instance, we've purchased surplus commodities, provided flexible LDP eligibility requirements for silage, made cash payments to small hog operations, announced a number of targeted livestock indemnity and emergency feed assistance programs; and we're using all servicing authorities, including rescheduling and reamortizing, deferring installments and debt write downs to assist those producers who are FSA borrowers.

More money will be needed to provide direct and guaranteed loans to family farmers in 1999. Credit is no substitute for income, but credit is essential in any farm operation. Demand for FSA farm loans in FY 1999 has been extremely strong. Commercial lenders are utilizing FSA loan guarantees to restructure the short-term indebtedness of their customers into more favorable long-term rates so that they can continue to provide financing.

Funds are exhausted or will soon be exhausted for key credit programs: all emergency loan funds and non-targeted direct farm ownership funds have been expended already, non-targeted interest-assisted guaranteed loans and direct farm ownership loans will be exhausted in March, funding for direct operating loan will last into April; and guaranteed operating loan funding will be gone by August. Secretary Glickman has said he will seek supplemental funding for farm loans and will be submitting a request for additional funds soon.

These are temporary measures which are needed to help America's family farmers weather the current crisis. We still need to strengthen the farm safety net to help American agriculture

prosper in good times, and in bad, without the need for this level of *ad hoc* assistance.

Strengthening the Farm Safety Net

The first step in building a stronger safety net is improving our risk management tools, mainly crop insurance and our credit operations. We must do everything possible to encourage program participation, to correct inequities in the structure of premium rates, yield guarantees, or other program provisions, to make the program user-friendly for companies and producers alike, and to facilitate new product development and other program innovations.

We look forward to working with Congress on specific proposals for crop insurance reform based on the principles of maximum participation, comprehensive coverage, use of market mechanisms, flexibility, and program delivery at the lowest possible cost to taxpayers and producers. Achieving these goals will provide a strong foundation for the reliable and effective safety net that producers need.

While we believe crop insurance is a key element of the safety net, we need to look at a broad range of ways to help farmers manage risk. These ways should include allowing the Secretary the flexibility to extend the due dates on market assistance loans to ease the pressure on cash flow. They should include incentives for establishing on-farm storage facilities to give farmers greater marketing flexibility. We also need a simplified farm credit application process and more flexibility in such areas as the number of years that a farmer can participate and shared appreciation.

Expanding Agricultural Exports: From a Residual to a Competitive Supplier

We must strengthen the farm safety net in ways that make us more competitive overseas and not lose sight of the fact that longer term trade prospects remain relatively bright. We still view exports as the driving force in bringing prosperity back to the family farm.

This year producers have become much more aware of the importance of the world market to them. As exports go, so goes the farm economy. This is because agriculture is much more dependent on exports than other sectors of our economy. Developments in overseas markets during the past year have certainly demonstrated this point. As markets in Asia, Latin America, Russia and elsewhere experienced financial turmoil and their imports of food and agricultural commodities were reduced, the impacts of those developments were felt throughout rural America.

Can the U.S. export its way out of the current agricultural price slump? We must be realistic in our expectations and not offer false hopes. U.S. producers cannot prosper when its customers do not. The global financial crisis has lowered absolute wealth and thrown 40-45 percent of U.S. export markets into recession. However, it is our expectation that the anticipated restructuring of many of these economies will result in even healthier economies and ultimately larger markets for our products in the long term.

A substantial portion of the reduced growth in the new baseline is due to lower

expectations regarding Chinese coarse grains and wheat import needs. As a result, long-term prospects for U.S. grain exports are lower than before.

The best way to get a sense of perspective today is to take a step back and compare our export trends from the ten previous years (1985-1995) to our projections over the next ten years (1995-2005). The rate of growth is basically the same. The peak in 1996 appears to have been the result of extraordinary factors -- strong foreign demand (especially China), large U.S. crops, reduced export competition, and a favorable U.S. dollar.

Exports have fallen from their high of \$59.8 billion in 1996, but all we have done is return to the longer-term baseline trend, which shows consistent growth. All volume indicators continue to show steady increases in world food consumption in almost all markets. Our challenge is to position ourselves to take advantage of these consumption gains and move as much as possible from our historic position as a residual supplier, especially in grains, oilseeds and fibers to a competitive supplier.

That being said, the next ten years is not going to be as easy as the ten previous years--the competition is much stiffer. Technology advancements will allow competitors to gain market share if we don't continue to become more efficient. The salvation for the United States has always been its ability to remain a leader in productivity. It will also take a good policy environment, which we will push for in the next round of trade negotiations set to begin in November in Seattle, as well as aggressive, creative, hands-on buyer-meets-seller marketing to take our exports to new highs.

If we see an opportunity to provide export assistance or challenge trade restrictions by others, we will strongly pursue it. We will continue to use all of our export tools to help American farmers and ranchers weather this economic crisis. For example, we have expanded substantially the level of CCC export credit guarantees made available to markets in Asia, which otherwise would have been unable to obtain financing for their food and agricultural imports. As a result, sales registrations under the guarantee programs exceeded \$4 billion in 1998, an increase of 40 percent above the previous year. For fiscal 1999, we have made available roughly \$4.2 billion in export credit guarantees, so far year. This total does not include our anticipated \$1 billion program for South Korea. We are continuing our negotiations with the South Korean government over the commodity mix to be included in that package.

Turning back the clock a bit, we are using long-dormant authority under the Commodity Credit Corporation Charter Act of 1933 to purchase surplus wheat to be subsequently donated under the Section 416(b) program to needy people overseas. When all is said and done, we expect to ship nearly 10 million tons of food under our various food aid authorities this year. This includes roughly 3.1 million tons of food for Russia. Our package for Russia includes 1.7 million tons of wheat, 500,000 tons of corn, 300,000 tons of soybean meal, 200,000 tons of soybeans, 100,000 tons of rice, 120,000 tons of beef, 50,000 tons of pork, 50,000 tons of poultry, 30,000 tons of nonfat dry milk, and 15,000 tons of planting seeds. The U.S. and Russian governments have established an unprecedented monitoring program to ensure that aid reaches the targeted populations throughout Russia and USDA is devoting substantial resources to monitor the delivery and distribution of the food aid.

There has been speculation that USDA would be announcing additional aid for Russia. We have told Russian officials that before any additional aid is considered, we must see that the initial shipments go smoothly. We also must have more information regarding the need for additional food assistance. In Russia, as elsewhere, we take great care not to displace commercial sales.

We are using other tools as well, for example, fully utilizing the Foreign Market Development Program and the Market Access Program. The President's budget for FY1999 calls for full-funding for all our export programs. It also introduces two new programs we will implement this year: Reverse Trade Missions to bring foreign buyers to U.S. trade shows; and the Quality Samples Program to let potential first-time buyers try U.S. grains at no risk.

We must also move forward with greater market reform in the next round of world trade talks which begins later this year in Seattle. Although the Uruguay Round was a landmark agreement for agriculture – more was done to liberalize trade and bring agriculture into the GATT system than in all previous rounds combined – we have to recognize that agriculture still has a long way to go to complete its reform and be fully integrated into the world trading system. Our goals for the upcoming WTO negotiations include: elimination of export subsidies; substantially cutting--and where possible eliminating--tariffs on farm products; tightening rules on domestic subsidies; reforming state trading enterprises, and tightening rules on technical barriers that unjustifiably restrict trade.

In addition, we will continue to work to resolve the contentious bilateral trade issues that hinder our exports, such as the EU ban on U.S. beef, restrictive Canadian import policies for livestock and wheat, and unfair Chinese restrictions on U.S. wheat.

Conclusion

Let me conclude by saying that we at USDA take very seriously the President's challenge—we must return prosperity to the family farm. We are committed to utilizing all of our tools and where necessary work with Congress to improve and deepen these tools.

- Provide short-term emergency assistance;
- Strengthen the domestic safety net; and
- Rejuvenate Agricultural Exports and move from a residual to a competitive overseas supplier.

Thank you.

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MARKETING STRATEGIES FOR THE NEW MILLENNIUM

Transcription

Moderator: Ken Root, Host, Agri-talk Radio

Panelists:

Sonja Hillgren, Editor, Farm Journal

Lynn Rundle, General Manager, 21st Century Grain Processing, and CEO, 21st Century Alliance

Thomas Joseph Trantham, Jr., Trantham's 12 Aprils Dairy

Gene Nicholas, State Representative, North Dakota House of Representatives

Larry Doyle, Executive Vice President, AgFirst Farm Credit Bank

Terry N. Barr, Chief Economist and Vice President for Agriculture and Trade Policy, National Council of Farmer Cooperatives

MR. ROOT: My name is Ken Root. I'm the host of Agri-talk, a national talk radio show about agriculture and rural issues.

My comments are my own, and do not necessarily reflect the views of the U.S. Department of Agriculture or this conference.

This panel is on marketing of the production of our farms. More specifically, marketing strategies that will serve an industry that is stressed right now, and may be stressed even more in the new century. It's about strategies to try to bring it up to a par with the marketing of other sectors of U.S. and world business.

Now, that in itself is going to be quite an accomplishment, to be able to market as well as other businesses, because marketing, unlike production, is a science and an art. And today is the perfect day for me to make this point. It is the day that one of the best known American companies on the worldwide stage is releasing a new product.

Coca-Cola, which was first created in Atlanta at about the same time as the Washington Monument was built, remained the same product from that era of the late 1800's until 1960. In 1960, Coca-Cola realized that they might be doing a little bit better if they marketed something besides one product and one formulation. So at that point, they began their modern focus on marketing. Coke introduced products that had less in them than the original.

They took out the color and caffeine, and they called it Sprite. They took out the calories and they called it Diet Coke. They took out the caffeine again, and they called it caffeine-free

Diet Coke, and regular Coke. And today, after taking out the color, the calories and the caffeine, they will market a new product without carbonation. You know it as water. And it costs the same as Coca-Cola.

Now I don't think we're ever going to get this good in agriculture, unless you can sell the bone from the T-bone, and call it T-bone light. But you will find, I think, in coming months, that this new water from Coca-Cola, which obviously I do not have, tastes far better and far different than this water. Up to this point, the best tasting water in any taste test has been tap water from Los Angeles, but that's really irrelevant.

The water will be called Dasani, I think, and it will become as much of a recognized brand name and household word as Juanita Broderick in the months to come--you'll get that at a later time, I am sure.

Now, not all marketing strategies have been as good as those of Coca-Cola. Perhaps you remember when Chevrolet came out with a car called the Nova. Directly translated into Spanish it means, doesn't go. And if you've had one with more than 25,000 miles on it, I think you would call it just simply truth in advertising.

Also, Frank Perdue's chicken slogan, "it takes a strong man to make a tender chicken," translated directly into Spanish comes out as, "it takes an aroused man to make a chicken affectionate." But bottled water here is a want. It is handy. It's a statement. It's a status symbol.

An automobile by its brand name, is only partly utilitarian. But food and fiber are basic needs. We've discovered in agriculture, in an affluent society, which we now have in America, the populace tries to spend all of its money for what it wants and none for what it needs.

In these closing days of this century, agriculture has become highly productive, but it is drowning in its crops and livestock. Is this because its marketing strategy has been less creative and less important than production? What must the industry of agriculture do to sell its products at a profit? How can it increase demand and create new products and new markets?

Well, our panel today is made up of broad-based observers of the marketing skills now possessed by farmers, ranchers and agri-business. They are also innovators in new marketing strategies for agriculture.

I would like to introduce each one of them, and allow them to make brief comments on their general views of why marketing strategies must change. And if applicable, their current work to market agricultural products in a new way. And then we will have a brief exchange of concepts and ideas based on some real world events that have happened in the last year. And then we will ask you, the audience, to join in with us in the same manner as earlier.

Look for the microphone before you ask the question. Your questions and comments are appreciated. As a person who makes his living on talk radio, I would like to emphasize one word, relevant. Hopefully, they will be that. And at the end, we are going to have our panelists do something that we hope will get you thinking even more. They are going to make a prediction. They may decline, but I'm trying to get them to make a prediction of a singular significant marketing or market-oriented change in agriculture we will witness within the next 20 years.

So let me begin on this end with Sonia Hilgren, who is the editor of Farm Journal magazine, and executive vice president of Farm Journal Corporation. Ms. Hilgren holds a bachelor's of journalism and a masters of arts from the University of Missouri School of Journalism. She's been named a Neimann Fellow at Harvard University.

She's been farm editor with UPI in Washington, Washington correspondent with Knight Ritter Newspapers and Washington editor for Farm Journal before her current position as editor

in Philadelphia. Sonia was president of the National Press Club in 1996, and last year she was awarded the Oscar in Agriculture for her distinguished career.

Sonia, from your vantage point as a journalist and observer of the political and policy side, what's your grade card on how agriculture has done in this late 20th century in its marketing strategies, and how would you say it will have to change in the 21st?

MS. HILLGREN: Ken, what I'm really worried about is not the 21st century. I'm worried about the last year or two of the 20th century, depending on whether you are a purist about the 21st century beginning in 2001.

I do want to take issue, as I like to do with Ken, as frequently as possible, with something you said about the want and the need. The fact is that food is very related to wants, and chefs are producing all kinds of fabulous things. It is really a reflection of a service economy, all the way through.

MR. ROOT: Yes, but the want occurs after it leaves the farm.

MS. HILLGREN: That's certainly true, but food is very, very associated with wants. Anyway, I will segue into farm production of raw commodities, because that is the difficult situation we are facing.

A keen observer of agriculture told me just last week, and he summarized it as well as anybody could, in the 1980's, a lot of the people who quit farming were people who were not the really strong producers. And in the 1990's, a lot of the people who quit farming are the people who are not good marketers.

This is the kind of thing that people have been preaching for years and years and years. And the reason that American farmers have not embraced it wholeheartedly is, (a) we had some farm programs that didn't require them to do it, and (b) it is really difficult.

If anyone who is not a producer doesn't think it's difficult, you should just think about your own portfolios, and think whether you timed the stock market as well as you would like to. We can all think of the financial mistakes that we make. But basically, with a producer, and with all of us as individuals, if you get in the upper third of price ranges or stock prices, then you are doing pretty well.

I've just come back from the commodity classic, the meeting of corn and soybean producers in Albuquerque. A lot of folks were talking about their neighbors who are going out of business because they want to get out before they lose their equity.

There are an awful lot of guys I talked to who are very good producers, and have their bins full, and I would say too full of crops, because they thought the crops weren't worth very much last year, and they are going to be worth even less this year. But, you know, as we all know, American farmers are terribly resilient, and I see a real interest in serious marketing education.

If you think marketing education and just doing it is not important, take a look at the University of Illinois's ag. mass results, that just came out, and show a difference between average prices, average marketers, for a 1000-acre 50 percent corn, 50 percent soybean producer. There is a \$70,000 spread.

In the 1997 marketing year, which extends from September '96 to August '98, the top price was in the \$6.70's for soybeans, and \$2.70's for corn, which is kind of hard to imagine, in

view of some of the really bad prices we had last year. But there are always price opportunities, even in this situation.

As Keith Collins said, clearly, there is a push to soybean production, because of the LDP's, because of the lower cost of production. The interesting thing about that is that if the soybean price goes down to a certain level, that will be a discouraging signal to the Brazilians who are expanding like crazy.

I want to say a word for good old fashioned crop production. This also makes a difference. We are into economics and marketing here. But there is a lot that producers can do to increase their yields. We spend a lot of time at Farm Journal talking about even adjusting your planters. You get 150 bushels at \$2.00, that's \$300 an acre; 180 bushels at \$2.00, that's \$360 an acre. And it might be the same inputs if you really, really pay attention. So producers have to pay more attention to marketing as never before.

MR. ROOT: Let me introduce Eugene Nicholas, the chairman of the North Dakota House Agriculture Committee. He has been a State Representative for 24 years, and is now beginning his 10th term as the House Ag. Committee Chairman.

Mr. Nicholas is a citizen legislator. He is a farmer, the owner and operator of a grain and livestock farm for 31 years. He's a graduate of the North Dakota State University in business, economics and political science, and was recognized as the school's outstanding agriculturalist in 1990. And a major reason we are pleased to have Gene with us today on this panel is that he serves on the Board of Directors of Dakota Growers Pasta Company.

Mr. Nicholas, your views on agriculture's marketing skills and the innovations going on in North Dakota?

MR. NICHOLAS: Thank you, Ken. I have had a very unique situation, having been a farmer, citizen, legislator.

We have had the ability in North Dakota to put several programs together that have helped enhance the value-added agenda in our state. First and foremost has been our Ag. Products Utilization Commission. This has allowed farmers to go to a committee and get grants for feasibility studies that can help put these value-added ventures together. We commit approximately \$2 million dollars per year to this program, and it has been recognized throughout the country as one of the most successful programs for doing value-added agriculture.

The project I specifically want to speak to you this morning about is Dakota Growers Pasta Company. In 1990, myself and several other North Dakota farmers formed a steering committee and by the fall of 1992, we were operational with Dakota Growers Pasta Company.

We had a \$12 million dollar equity drive throughout North Dakota, and we now have one of the fastest growing pasta companies in the U.S. As you know, North Dakota leads the U.S. in durum production. We have now taken 20 percent of the total North Dakota durum crop out of the rail car and put it in the box. We are sending that out of North Dakota, creating jobs.

We have created more than 600 to 700 direct jobs in our state in this value-added industry. I would say this is a success story that is unparalleled anywhere else in the country. We not only have put it in the box, we have made a profit putting it in the box.

I know my Arab ancestors would be very happy with this process, as most of them are rug merchants. But when my grandfather came from Lebanon in the 1890's and homesteaded on land in Towner County in North Dakota, they sent everything out by rail car. By putting it in the box, we are now paying a dividend to our farmers.

Since we have started, the farmers have received all of their capital investment back from that initial investment. In 1997 and 1998, we paid \$1.00 a bushel cash dividend to our farmers. And we paid about 80 cents in those two years. In 1999-2000 operating year, I am optimistic that we will again pay \$1.00 a bushel to our durum farmers in North Dakota that are members of our coop.

That is a substantial return on their investment. And we know that in agriculture, most farmers only receive about a 2 percent return on their investment. In manufacturing, they receive more than a 13 percent return on their investment.

So as we look to our future and see these kinds of returns on the investment to the North Dakota farmers, this is an area of agriculture that will continue to grow in North Dakota.

Let me tell you the other areas where this is growing in North Dakota. The U.S. spring wheat processors project is now underway. They were successful in raising more than \$25 million dollars this past year to launch that project. That is currently under construction, and I believe will be another successful value-added venture.

We also have the North American Bison Cooperative that is paying a dividend to North Dakota farmers. We currently have on the drawing board a beef processing plant and several other different types of value-added ventures. I think that we are on the way to success in a new area of agriculture.

We are trying to move away from complete dependence on government programs, government programs that served us quite well for 60 years. That was a way of life in North Dakota, and most of us spent the winter trying to figure out how to farm the government program.

If they come back as we have known them in previous generations, we will again continue to do that. As we move into the next century, we have to learn how to market our product. I think we are doing a good job of that with our value added coops and LLC's, and I look forward to a profitable future as I move into the next century.

I have told my son, who farms with me, that I think the most important investment that we are making right now is the stock that we are buying in the value-added LLC's and coops. As we plant our 1999 spring durum crop, this will be the first time in the history of our farm that we will have every bushel covered by a value-added coop. In other words, every bushel of our product, all of the durum on our farm, will go to our own marketing fully integrated processing plant. So I think we are headed in the right direction, and I think we will survive as we move into the next century.

MR. ROOT: Gene, thank you very much. I think this is a great illustration of the work not only of farmers together, but also the work within their legislature to encourage this sort of thing. Our next speaker said that your project was the granddaddy of his. Lynn Rundell is the CEO of the 21st Century Alliance, an organization of 750 farmers in six states, with a vision to invest in value-added agricultural businesses. He is also the general manager of the 21st Century Grain Processing Cooperative, and the 21st Century Dairy, two business ventures owned by that alliance of farmers.

He was a graduate of Kansas State University before it became a football powerhouse. He owns a masters degree in agriculture education. He was a vocational agriculture instructor for seven years. He previously served as the executive vice president of the Kansas Association of Wheat Growers, and also as a rural development specialist for Kansas Farm Bureau.

Lynn, your views on agricultural marketing strategies, and the work of the 21st Century Alliance?

MR. RUNDELL: Well, first of all, Ken, can I ask you who's the fifth batter for the St. Louis Cardinals?

MR. ROOT: Nobody cares.

MR. RUNDELL: That's kind of the way I feel today, because you just heard from the home run hitter. Gene Nicholas and Mike Warner have been scoring home runs by the dozens in North Dakota and Minnesota the last 10-15 years, with United Spring Wheat Processors, American Crystal Sugar, and Dakota Growers Pasta.

And they were kind enough in 1996 to come to Kansas and start talking to our farmers about what would happen if you could get a bunch of farmers with a common vision, and who could put together their capital, their resources, and to put together businesses that created value for our crops in the central Plains: for hybrid winter wheat, for corn, soybeans, pinto beans, alfalfa, whatever.

And they came to Kansas and started sharing that vision with our farmers in 1996. And out of that beginning came the 21st Century Alliance. I'm going to take my four minutes, Ken, to talk about how the 21st Century Alliance has organized and what our vision is.

The 21st Century Alliance is an organization of 750 farmers today representing seven different states. Most of those producers are from Kansas, because that's where we start. That's where our roots are. But we have members in seven different states who have decided to become value-added farmers in the central plains.

By the end of March, we will have raised \$7 million dollars, and invested in five different value-added coops, and I will name those in just a minute. The way to get in the alliance, it costs \$750 for a farmer just to join the club, to get in. And all that \$750 does is buy them an opportunity to look at value-added opportunities in agriculture.

So far, of those five businesses, we have 375 of those farmers for our first real project. We bought a flour mill in Rincon, New Mexico. So 375 farmers raised about \$3.2 million dollars and delivered 2,850 bushels of wheat per share to New Mexico in an IP system to feed our flour mill.

We also have 100 farmers who invested about \$1.3 million dollars, and we're just starting production next week in our first 1,500-cow dairy. We also raised about a half million dollars and built, bought and are operating a small pinto bean processing plant in Colorado and Kansas. We have just started a stock sale. We are projecting about 200 farmers to participate in a 2,600 cow commercial dairy where farmers will deliver corn, milo and alfalfa hay as part of their delivery obligation.

And the last one is an ag. fiber company that is going to cure straw and other fibers for what we think is going to be a new industry, to make things like wheat-straw particle board. They have been started in other parts of the world. Canada has got a \$100 million dollar plant. But if they are looking for a place to build a plant, we think Kansas, because we are the wheat state, will be the next place.

So those are the five businesses we've started. And since we've started the businesses and gained a little bit of credibility, we've had lots of agriculture business come to us.

We also have one other small project, and last year we did identity preserve about a half a

million bushels of wheat for a company that I won't name, but it is a food company in the central Plains. And from that one little segment of a few farmers putting their resources together, which was identity-preserved wheat, we were able to capture about 25 cents a bushel above the market price for those producers.

It is an age old idea of what can happen if you get 750 farmers working together. I ask farmers all the time, "what would happen if you had five farmers working together, what you could do?" And it is really true. There is real value in that. If we are able to organize farmers, the sky is the limit about what farmers can do in joint marketing efforts.

It takes three things: organization, vision, and credibility. And because I work with the best farmers in the world, we are able to capture those things. That's the strength of what we are trying to do in the central Plains.

MR. ROOT: Lynn, thank you very much. I had time to think about the answer to your question, who is the fifth batter for the St. Louis Cardinals. The fifth one in that inning to score against the Royals will be the answer I would give you.

Our next speaker this morning is Thomas Trantham, Thomas Joseph Trantham, Junior. Mr. Trantham is a dairy farmer from South Carolina, and a member of the Small Farms Commission. He formerly was a grocery store owner in California. He got into farming with no farm background in 1968, and got into dairying in 1978, and became one of the outstanding dairy farmers in the state in just two years.

He is now one of 122 dairies in the State of South Carolina, but he is one with the concept, maybe he's not one of one, but he's one of few with a concept that is reflected in the name of his dairy. It is 12 Aprils Dairy, and with the wind and the cold out there today, I would love for it to be April all year around here. He tries to make it so for his cows.

And if you will look at the front of a book that you may have gotten outside on Exploring Sustainable Agriculture, those are his cows. It looks like April. And they look like they are contented.

Mr. Trantham is a small dairy farmer. I'm sure our audience is most interested in your grade card of the marketing skills of U.S. agriculture, the prospects for the future, and what you are doing.

MR. TRANTHAM: Thank you very much. It's certainly an honor to be here today. But to get right with it, I think there are two directions in agriculture in this country today, the two strongest, I'll say, of many. One is the industrialization of our agriculture, where we consolidate our farms into large production units, and contract farming and so forth, and the focus is on production. In the last 50 years we have focused on production, basically, and that's about all. And we are suffering from that at some points now.

And on the other side of the coin, I see the small family farm involving itself in specialty markets or methods, and more environmentally sound. The family farmer can respond to environmental problems a lot faster than some of your larger units, as we know.

I'm going to tell you about a guy that this happened to, and I happen to be the one. In the 80's, I was the top producer in the state. If I wasn't in the top 10, I'd about have a heart attack. You know, I'd think I was going out of business, because I felt that production was the only thing that was out there for me to survive as a farmer. And unfortunately, I think that's the case today. Most farmers feel that production is the only way out.

But in turn, I had high interest rates and was tremendously in debt. I began to lose the value of my farm. My financial situation was very dim. I was unable to acquire funds for the coming year.

I had a broken down manure spreader, a whole lot of manure, and a bunch of cows. And that was about all I had as assets at the time. So I was in trouble with the environment on the manure, so I spread it out in one field, and the cows, I was in debt with my feed company.

So anyhow, April came, and I was really in a serious situation. But I let the cows into this pasture that I thought they ought to be in. It was clean, and there was nothing there to eat, but it was clean, they would be easy to milk that afternoon.

I no more got them in there, the majority of them were laying down. They'd eaten their TMR, their total mix rice, and they were laying down. I was trying to put up an old fence that I had. I have a gate there now. But at that time, just an old gap fence. And it cut me. And then no more than I got it up, and two heifers already went through the fence.

So I was tremendously disgusted. I threw the gate down. I said, do anything you want to do. And they did. They got up and all went to work. Every cow got up. Every cow went somewhere, where I had thrown the manure prior to that. Nice lush green grass. They all went to work. Every head went down. All those cows went to work.

So, you know, I said, what the heck. The next day I was up two pounds in production. So I began to focus on something besides production. I focused on less input costs, and a better way to get milk.

Through the USDA program, the SARE program, Sustainable Agricultural Research Education, a guy kept telling me, Tom, you ought to do something with this. You are really gaining ground here.

He convinced me to take my plan over to Clemson University. And it went over kind of you know--but I said, "Look, just come to my farm. Come see what I'm doing. I can't tell you enough. You need to see it." They did come. It was the highest rated proposal that year in a southern region in the SARE program.

To make a long story short, we did three years of research at the farm. And this picture that you are talking about is part of that three-year research. That is alfalfa-graze. My cows were grazing alfalfa seven months of the year. My production originally went from 20,000 down to 15,000. Then as we proved this program would work, and worked with it, I'm back now to 18,900 pound average. I've reduced my input costs 25 to 40 percent.

We just suffered the worst drought in my time, last year in South Carolina. Even with that, I showed a profit at my farm. So the thing is, the change came to me not because I was so smart, but because I was desperate. But through the USDA program, I was able to do that.

I am known in South Carolina as the dairy farmer with happy cows. The director of extension said he had heard that and he came to the farm one day, and he laughed and he said, "The man does have happy cows." So I feel that we can look into the agriculture in different and better ways. We don't have to focus on production. There are many, many more things that we can do, and that's what I'm about. And I think that we all need to focus on the environment, and the things that make a difference in this country. Thank you.

MR. ROOT: Mr. Trantham, thank you very much. I'm sure there are more questions people may have of you, either up here or individually. Well, now we come to the economist and the banker, over here at the far end, two professions I always enjoy.

I put you at the end of the panel because it is as close to excluding you as I could get. The reason is, one of your professions tells us what we don't want to hear, and the other one makes us do things we don't want to do. I suppose you are a necessary evil, and between you, perhaps you can work out which one of you is necessary and which one of you is evil.

Dr. Terry Barr is chief economist and vice president of agricultural and trade policy for the National Council of Farmer Cooperatives. Dr. Barr holds a Ph.D. in economics from Washington State University. He was employed by the USDA beginning in 1971 at the Economic Research Service. He chaired the World Outlook Board, and worked later on policy analysis and the Secretary's staff. He has been with the National Council of Farmer Cooperatives since 1985.

And Mr. Barr, despite my little jabs earlier, we really need the perspective of an economist and a supporter of cooperatives to tell us what we need to do in agricultural marketing.

DR. BARR: Well, I guess I'll take on the mantle of evil, since everybody is going to need credit. So that becomes necessary. I'm going to take a little different tack on this one, because when I look at this topic, the first question that comes to my mind is, what is the market we are trying to talk about?

When you look at this U.S. marketplace today, it is a different market than it was 10 years ago. It is a mature market. It is growing slower. Demand for food is now not about food, but about food characteristics. This marketplace is vastly different in just the last 10 years, and we are going to see a different market that has to be addressed by the producer.

Raw product value is going to be a smaller and smaller part of this industry, because consumers want more services, more properties associated with food will be added after the farm gate. And those are just the realities of this domestic market. This market is simply not the commodity market it was 10 or 15 years ago. And I think producers have to accept that reality.

Additionally, in such a marketplace, mergers and alliances to protect market share and spread costs are going to accelerate. Efforts to explore information technology are going to accelerate, and you can expect intensified competition between branded and private label companies.

The transaction costs of alternative arrangements in the food systems are going to be the big keys. So producers have to look at themselves in terms of where they fit with regard to transaction costs. Retailers are going to seek to maximize flexibility by outsourcing all of the costs that they can outsource, to maintain flexibility.

We've seen a lot of strategies talked about today, in terms of approaches. I will remind you, however, that we are in the middle of, or perhaps nearing the end, of one of the longest post-war economic recoveries that we have seen. So we haven't really tested an awful lot of strategies yet, under a severe test of this new food system. So I think we need to be prepared to make further adjustments in all of these strategies as we go forward.

I would just make a couple of points on new strategies. First, recognize the difference between marketing commodities and marketing product characteristics, because you are no longer in the commodity business. Understand the value chains in which you participate. Seek alliances to ensure participation. Value what you bring to the chain, not just the commodity characteristics.

Information is crucial, and becomes a source of strategic competitive advantage in this type of a food system. Learn contract law as well as you understand production technologies. Accept that production decisions will be largely made by those who purchase your product

traits. They will dictate the input bundles that will be utilized. Producers must cooperate with each other if the role of a price-taker is to be avoided.

If you are going to remain a commodity producer, be prepared for more volatility, greater risk, and greater global competition from transferred technology. Your future lies in the export market.

MR. ROOT: Thank you very much. Now, let me turn to our last person, who will give us a basically generally formal statement. Then will start the questions, and then engage you to join with us.

Larry Doyle, thank you very much for being here today.

You are the executive vice president of AgFirst Farm Credit Bank in Columbia, South Carolina. So there are two of you from South Carolina here together. You have an MBA in finance from the University of South Carolina. You are a 1974 graduate. You've spent your career in farm credit, two years with an electric cooperative. You also have coop and farmer loan experience.

You are a native of South Carolina from a tobacco farm, and still have an active interest in that farm. From the lender's perspective, give it to us straight. Has marketing been the farmer's weak point, and can agriculture do better in the years ahead, and how?

MR. DOYLE: Well, I guess I would open by saying that certainly marketing has been the weak point. If you look at that it is a little bit like the field of dreams with U.S. Agriculture. If you purport there is a market there, certainly in the United States we can produce an abundance and we are great at production. But we are not so good at how to market the product.

I think we would generally agree, as far as looking down the road, that while we are sort of in a painful transition at the moment, that it is likely the worldwide demand for food will increase. It is also likely that with globalization, while even though we are in a little bit of a slump now, there is going to be more improvement in affluence worldwide.

So if you look at it from the U.S. producers' prospective, it is a pretty positive period, once we get through the transition. What would concern me most, though, is following off of Mr. Barr's comments. All bankers tend to think of risk all the time. And if you think about the greatest measure of risk, it is volatility. And if you look at agriculture in its current state, there is tremendous volatility, especially since we have reduced the supports for farmers, and they are more at an open market system.

I think Mr. Barr mentioned moving away from a commodity basis. As a lender, I would be more concerned than anything else about that particular aspect. Farmers must figure out how to move away from just being a producer of a commodity.

Now, there are lots of different ways to do that, and in the Mid-Atlantic and Southeast we at AgFirst are a federated cooperative, we are a wholesale lender to 38 lending cooperatives that operate from Pennsylvania to Puerto Rico to Louisiana. As we look at our borrowers, we've seen many marketing strategies. So when I speak, I would not speak necessarily from the farmer's prospective, but I get to see proposals and see what people have done.

Farmers can do much for themselves to vertically integrate. And when someone thinks of vertically integrating, they also think of giving up the control or all the other negative things that come to mind. But I've seen so many different methods to vertically integrate. You can do it through alignments. You can do it through partnering. You can do it contractually; that is,

having someone that is in processing and marketing and has brands to agree to some type of participatory contract on a cost-plus basis or things of that nature.

For those who like to cooperate with one another, we always have a natural in cooperatives. But some people like to keep their business more to themselves, and don't always enjoy capitalizing or supporting a cooperative. Certainly for me, coming from a cooperative, I think that's certainly the vehicle by which small producers can mimic the activities of large corporate operations.

But whether you choose to join a cooperative and do the value-added approach that we've already heard about, or you choose to partner with someone, contractually obligate your production to someone, or align with others, a farmer certainly had better begin to use some of those vehicles. I think that farmers will definitely not be able to be successful at moving forward unless they are able to reduce the volatility.

Now, there's a lot of industries out there where it is a natural to do that. I look at meat packers. They are as volatile as farmers. So isn't it natural for a meat packer to partner and align with producers on some contractual basis which can be counter-cyclical and smooth earnings for both parties? I would say that was the most important thing for farmers.

MR. ROOT: Larry, thank you for that. Let's loosen this up a little bit, now, and see if we can take a few questions from you in just a moment. Let me start out with the group.

We heard two Secretaries of Agriculture today, with a lot of experience. One of the things I got from it was that change is happening at an increasing rate right now. An example of this is the hog crisis of the last quarter of last year. It may not be specifically in your area, But I would like to get any of your opinions on this.

What can we take from what happened to the hog business last year, when prices plunged to as low as 9 cents, and the price at the supermarket did not go down at all. And, hog producers who didn't have any link to the packers were faced with bankruptcy in a matter of months?

MS. HILLGREN: I'd like to say something about that, because I spent some time with a producer who did have a link to a packer, a contract with IBP. And so he gets a basic price. But he owes IBP money, because IBP was giving him cash flow, and he owes money with interest.

MR. ROOT: So he had a ledger contract?

MS. HILLGREN: He had a ledger contract. So a connection with a packer is still iffy. You know, it's going to take him quite a while to get that \$75,000 back in prices that he owes IBP.

MR. ROOT: Well, Larry over here was talking about this connection with these people. Let's say we go this way, Sonia. The traditional producer who has felt like he didn't want a contract with anybody because he'd miss the highs, well now, he is basically not going to have any chance of being able to make any money in the long term unless he contracts with somebody. Is that the way you see it, that he's got to contract, Mr. Doyle, to be able to have any guarantee of staying in business?

MR. DOYLE: Well, being a lender, we've seen about everything, I guess, as far as structure. And hogs is a good example. In the Southeast, you've had a migration to vertical

integration. You have most of the producers who are contract growers, not just independents with a market price. So in that environment, the contract grower receives a price mainly for his labor and fixed assets.

If you look at stress in the hog industry in the Southeast, those contract growers are not feeling any pinch at this time, related to the hog crisis. Now, they do have some credit risk concerns, because they are being paid by an integrator or a hog producer, and it will hinge on how long and how successful those major companies or corporate farms are.

Those types of companies vary in size from small to medium to extremely large. If you are an independent producer, though, and we have others in the Mid Atlantic, you will have cases where folks have what Sonia described as a ledger contract. You will have others who have cost-plus contracts. And you will have others who are just receiving several cents a pound premium.

I feel like producers will have to evaluate all the alternatives, and seek the one that will give them a fair return with less volatility. But there are some relationships out there that work very well, even in the dire situation we have today.

MR. ROOT: Gene?

MR. NICHOLAS: Well, I always think there is a combination of circumstances when there is a catastrophe in the livestock markets. Go back to '86 with the whole herd dairy buy-out. We all know what happened to cash finished beef prices. Again this is a combination of circumstances. Number one, we had a major Canadian packer on strike. We had record numbers of Canadian hogs and livestock pouring into our traditional markets. Over the U.S., packers did not have the capacity to kill those animals, and so consequently there was a surplus of animals and the price went to nearly 8 cents a pound. That's unprecedented, since the depression of the 30's.

So I think we have to continue to look at our neighbors at the north, and the Canadians have been not only disruptive in our livestock markets; they've been very disruptive in our grain markets. They have a pricing policy on Canadian grain that would be illegal in this country. They have a monopoly up there, and we have them sending 25 percent of their domestic spring wheat into our market, 18 percent of their durum comes into our market, with a pricing policy that we can't even get access to. So look at what happened. Here is a catastrophe. Is that what's going to happen in the spring wheat and the durum markets? And they are both going down very fast. Last year's wheat prices might look good in comparison to what we are going to get this year.

MR. ROOT: -- the operations that Lynn is speaking of, one is 1,500, one is 2,600 cows. Mr. Trantham, how many cows do you milk now?

MR. TRANTHAM: 86.

MR. ROOT: And what's your goal?

MR. TRANTHAM: 60.

MR. ROOT: 60. Okay. We used to milk 100. My goal was zero. And we hit it.

MR. TRANTHAM: You needs 12 Aprils.

MR. ROOT: Can you coexist? Both of you are selling into the commodity market. Can you coexist?

MR. TRANTHAM: Yes, sir. Certainly. I've never enjoyed my life more, nor my dairy, and I'm selling to the second largest dairy coop in the United States. So the product that I have is of the highest of quality. They need my product, probably some of the other product needs my help. And so I think something we are going to look into is quality of product.

MR. ROOT: Are they paying you a premium for what you are selling them?

MR. TRANTHAM: Yes, sir. I do get a premium for low bacteria leucocyte count that I have. But I feel that this country right now is more concerned about the quality of its food than ever in its history. So I personally want to push on that. I want to let people know how good mine is. And I think that in the future I may even go into bottling on farm- processing. But these type of things are open. That's the thing about a small family farm. We're not controlled or limited to huge corporate companies, and these huge conglomerate-owned facilities that have rules and regulations.

When I was the manager of a Mayfair Market out in California, I had to comply with their rules to run their stores. They broke my one store loose and let me go on my own. It was fourth from the bottom when I took it over, and it was fourth from the top when I left it.

So I think the ability for the American people to involve themselves in their own lives in their own ways, that we can withstand. But we do need USDA to focus more on the family farm.

Eighty percent of the farmers in this country today are small family farmers, by the definition that we have. And with that, USDA needs to focus on the majority and not be so focused on the larger producer. And on production. Production is the driving force of agriculture. And we've got to change that.

MR. ROOT: You are saying that you have 80 percent of the farmers who are small, but you are not in the majority of total production. In fact, you are in the minority of total production.

Let me go to the other side of this, and without having to be competitive or even predatory on the smaller dairymen, your good, it seems to me, is to be as efficient as you possibly can, and in effect, that makes you competitive with a small dairy.

MR. RUNDELL: Well, let me make it clear that our dairy farms are owned by small family farmers. We have 100 small family farmers that own a 1,500 cow dairy in Washington County, Kansas.

And those producers are only are owning 10 or 15 cows. They don't have the management experience or the ability, like Tom, to run their own dairy, or the capital to spend a million and a half dollars and build a commercial dairy that is going to be competitive long term in this industry. But they've been able to pool their resources and their abilities, and make that happen, and be in a value-added situation as a producer.

That's not where we're headed, though. Long term, the farmers that own the Washington County Dairy, and the farms that own Ladder Creek Dairy, and want to be in the milk processing business. And it might be with an existing partner, rather than building their own bricks and

mortar. It might be partnering with an existing dairy processor, taking more of that food dollar that is going actually to the consumer.

So our goal is not just to milk cows. It is to become a milk processor. But to be integrated, so that we are protecting those 100 farmers that owned a piece of that dairy. They may own \$10,000 or \$15,000 of that dairy today. Our goal is to own a piece of that, and eventually own part of the processing industry. I think that's where we've got to be in the future, if we want to truly be marketing food products instead of commodities.

MR. ROOT: All right. Let's go to the audience here. Questions around the room here? Yes, sir. Allen, is it?

ALLEN: Yes, sir.

MR. ROOT: Hey, I just got a message for you. Your cows are out and you're supposed to go home and put them in.

ALLEN: That's what I've got a wife for.

MR. ROOT: You need to leave now. Oh, good. That will make her happy. That will make you a big celebrity at lunch.

ALLEN: These are all marketing experts, and brought up some good points, but I think Sonia brought up the best point. Last year, the producer had the opportunity, if he was lucky in his marketing or smart, whatever to market his product at a decent price, yet he still received a huge government subsidy, or payments in the process.

But this year, you guys are marketing experts, and here Keith Collins just told us that LDP is going to cost the taxpayer on soybeans alone \$2.5 billion, which relates to probably total LDP outlays for the taxpayer this coming year of \$4 billion dollars. And yet for \$400 million, we could an additional 6 million acres in CRP right now, and eliminate that cost, or at least address the disaster that we have facing the farmer.

Every speaker from the Ag. Department related to the problems we have. As expert marketers, shouldn't we be addressing those to Congress and the Secretary in the next 30 days, rather than letting this disaster happen that they are all talking about?

MR. ROOT: Would any of you like to address this, especially with the knowledge that in the short term, some farmers may go broke.

DR. BARR: Well, I think we've been down that road before. If you look back at the roots of the basic problem you've got in the markets today, in 1996, the world brought back into production about 40 million acres. Fifteen million of it came back in the U.S. Basically, we've rebuilt inventory since that period of time.

If we take the acreage out, the rest of the world is not going to take the acreage out. We've been through this before. We'll idle it. But it will not be sufficient to alter the supply/demand balances globally, unless weather intervenes. And we've been through these periods before, or we've used the PIC program in the mid-80's. And by and large, we simply give away our markets.

The better strategy is to turn it the other way and become much more aggressive in moving our product into the world market. So we can keep our acreage in production, and force global acreage out that is less efficient than ours. And that means matching government policies, the government policies of our competitors.

MR. ROOT: Gene.

MR. NICHOLAS: I agree with Mr. Barr. I think we have to get extremely aggressive in moving these products out of here. We have to export these products. We have to move them. In North Dakota, as in other states, soybeans, oilseeds, sunflowers and flax are the only crops that farmers are going to be able to go to the field with and get a cash flow. So the LDP's on the oilseeds are going to be enormous.

MR. ROOT: Tom.

MR. TRANTHAM: One thing we have got to realize is, for a farmer to survive, he needs a profit at the farm level. Today, we are receiving the least for our product that we ever have in the history of this country, yet our input costs are at the highest level they've ever been. And yet the retail price of our products is also at the highest level it's ever been.

When I was in the grocery business, in the dairy department, you made 15 percent, and that was it. If you got over that, you didn't sell your product. I can give you stores now that, chain stores in large areas, that are making 42 percent profit in the dairy department.

And a bushel of green beans: farmer's cost at \$7.00 and returning \$40 to \$60 at the retail level. I think we need to see a farm price, and we can take care of our product.

MR. ROOT: Well, may I ask you this directly?

MR. TRANTHAM: Yes.

MR. ROOT: Whose fault is it that the way you do business versus the way the middle man does business gives them the capability of squeezing you on the low end, and holding the price up to the consumer, while you just don't take any other avenue around them at all, and always sell through them?

MR. TRANTHAM: Well, I think the early 80's with Secretary Block here, certainly revealed a lot of it. We took down the fence rows. We stimulated production. And then our product was not sold like we were told that it was. So we stimulated production, which was the direction that we went from that point on, production at any cost.

With this huge production, we, in turn, allowed our coops, or whoever, to take our product at any price, because first of all, we had huge indebtedness on our farms. We had borrowed too much money. We borrowed it at too high interest rates. So we were locked in at that point. We had a perishable product, and a huge debt. We had no choice but to let it go at whatever a person would offer us.

MR. ROOT: Sonia, do you have a question? Then we will take a question from in the audience.

MS. HILLGREN: I have to ask a question of Lynn and Gene. You both talked about the success stories. There have been a lot of problems. For instance, ProGold and Minnesota Corn Processors had to be bailed out by Cargill and ADM. So I would like you to both discuss the down side.

And also, we can't have too much of it, so that, there is more production than the market will bear.

MR. NICHOLAS: Well, number one, the Minnesota Corn Processors got caught up in hedge-to-arrive contracts. That's a hedging problem. And ProGold, very simply, in the corn sweetener market, we were supposed to have access to the Mexican markets when that was established. And so far, since that inception, the access has not been there for those Mexican markets. But I will say that Pro Gold is still operational. The farmer's equity, hopefully, is going to be held together by the partnership with Cargill, and in the long term, that project will be successful.

MR. ROOT: It seems that it is clear, they don't all work. But you know, if you are walking off a cliff, or you determine you are, should you not look for another pathway that may result in something other than what seems to be inevitable for many farmers?

MR. RUNDELL: Let's just say there is no guarantee for success in any business. I think if you think of the risk involved in investing the value-added cooperative, I would say that cattle producers across this country think it is still pretty risky to raise a \$60 fat cow for five years in a row. So there is risk in all parts of agriculture.

And putting your money in a value-added cooperative or a value-added business has tremendous risks. I tell farmers at every meeting that we sell stock at, if you are not willing to lose \$20,000, don't invest it. And that is exactly what has to happen.

Farmers have to start thinking differently about their long-term capital investments in agriculture. We are here on a panel on marketing. Isn't it interesting there is nobody here talking about the futures market? We are talking about marketing products, instead of commodities.

Someone just said that we have to recognize differences between marketing commodities and marketing specific characteristics in the future. If farmers don't figure out ways to develop systems to capture the value of the future of genetically engineered agriculture, we are going to be left at the end of a contract production system that looks a lot like the hog production system, or the poultry production system. Is that what farmers and the grain industry want long term?

This value-added idea of farmers putting their capital together is not the only answer, but it is an answer for farmers who are willing to take marketing risks. And I'm talking about risks in the marketplace, with customers, selling their products to customers, getting closer.

We own a flour mill in New Mexico. That's a long way from the customer. But we're getting closer than we were five years ago. We've got 375 farmers who can market their identify-preserved wheat through a vertically integrated system to tortilla manufacturers in the southwest.

No, this isn't for everybody, but it is a way to capture some value, Sonia, if we don't do something different, we'll end up at the end of a contract. And I don't think there is a lot of farmers in my state, in my region, that want to be contract production growers.

MS. HILGREN: I was talking about the futures market, and even if somebody is selling to an entity like this, it is also good to hedge. Then you can really make some extra money.

MR. RUNDELL: Absolutely.

MR. ROOT: Okay. Let's take a question over here in the audience, or a comment.

QUESTION: For the record, both ProGold and MCP stockholders went broke because they continued to sell below cost of production, just like you guys are recommending to the American farmer, and they both bellied up. That's why they went broke, both of them. They kept selling, even below cost of production. And now you are telling American farmers to do the same. He can't -- either.

MR. ROOT: Yes, sir.

MR. McGRATH: A further question on Mr. Rundell's comment about the emerging biotechnology. My name is Mike McGrath, State of Delaware. We are seeing the multinational chemical corporations and even pharmaceutical companies are sending billions of dollars over the next five to 10 years to penetrate into the commodity market, and create value for not only human nutrition, but we've even heard for human pharmaceutical purposes within the plant production system.

But certainly these companies are going to look to recoup those research costs through ownership from the genome all the way to the supermarket shelf. How can the American farmer address this emerging and exciting technology, but keep some of that value on the farm?

MR. RUNDELL: I guess the simple answer is, if farmers don't organize themselves, if they wait and let it happen to them, they're going to get 15 cents a bushel above the market price for the highest value corn nutra-ceutical product that is out there in 10 years.

So if farmers don't allow themselves and don't put themselves together in groups that can IP products, and become vertically integrated, and look for partners instead of premiums, then we will be vertically integrated from the top down. We will be at the mercy of those high-tech genetic companies that own the research and the technology for 15 cents a bushel. Long term, we can't operate on 15 cents a bushel above \$1.80 corn. That still doesn't work.

MR. McGRATH: From the banker and the economist's side down here, are we in a trend that is so strong that it is literally inevitable? We will stay within a narrow range here of what farmers options are in the future for the majority of our production? And in saying so, are we then destined to have a major decline in the number of farmers in this country in the next few years?

MR. DOYLE: Well, I'll take the first shot at that. I think, certainly, the trend to consolidation will continue, mainly because of all the things that are being raised in the room today. Farmers have to worry about globalization. They have to worry about technology. And they have to worry about genetics.

I've spent my whole career as a banker in cooperatives. If you ask, "What causes cooperatives to fail?", typically cooperatives are under-capitalized, they have poor liquidity, and usually they settle for less than the best in leadership and management.

Cooperatives that flourish have a membership that is fully dedicated. They have a membership that has got a long-term view to establishing a presence in some part of business. They capitalize it well. They leave a lot of liquidity in the business. And they pick leadership that can compete against multinational companies, or any other players in the marketplace.

Cooperatives are disappearing. If you look at the characteristics of those who disappear, they will have those characteristics of always looking for the short run versus the long run.

Congress was very insightful, even back in the early 1900's. First, it gave agricultural producers cash basis tax accounting. Then too, they gave the farmer's cooperative the ability to take advantage of single taxation.

So he has an advantage as a business structure. Now, the fact in agriculture that we won't belly up to taking advantage of what Congress visualized and those with a lot of vision in the early 1900's talked about, is really our fault, completely. So about the question of genetics, about the question of technology, and about the question of how to compete in a global economy, a cooperative is a natural extension of the farm. In theory, if every farmer would get all of his inputs and market all of his products through cooperatives, and in turn would expect those cooperatives to operate and give a return on capital comparable to everyone else in other forms of business in the marketplace, then he is actually getting all of his inputs at cost.

That sounds very theoretical, but there are a lot of cooperatives where that works, and a lot where it fails. But generally, where it fails, the members don't want to capitalize it.

The hedge-to-arrive contracts are an interesting thing from a banker's point of view. What's the underlying problem with a hedge-to-arrive contract? It is that the farmer might not deliver what he said he would deliver. Now, management probably should have had a contractual obligation for which he could sue the farmer, but the fact is he saw a greener pasture, delivered the product somewhere else, and left his cooperative holding the bag.

So until farmers take a longer run view, and get in a self-help mode to take their business, and take advantage of the things Congress has already provided, it's going to be pretty dismal. And it will be just like the gentleman just talked about. It will be ADM and everyone else who bellies up to the bar and gets a return for their stockholders. If farmers want a return, a piece of that, they are going to have to form their own companies and take the return as stockholders themselves.

MS. HILGREN: Well, cooperatives have been consolidating like everything else. I've been getting some letters from readers complaining about the size and power of the largest coops. But finally, they are large enough to be able to compete with the multi-nationals.

MR. DOYLE: Some are.

DR. BARR: Let me make a comment on the producer opportunities. When you look at the marketplace that we're going to be headed into, the consumer is going to be very concerned about quality, about freshness, about traceability of the product. All of those things are going to give producers more niche opportunities in local markets, if they can capitalize those opportunities.

Now, that's not the mass market. You know, 6 percent of agricultural producers in this country produce 60 percent of all the output. So that concentration is going to go on. But watch what happens in the consumer marketplace. This population is getting older. It's going to move into retirement communities. Concern about food is going to be very much focused on the characteristics of it. And that's going to give opportunities for producers to put their label on it and say, we endorse this. It is safe. It is wholesome. We know how we've treated it. I'm ready to show you how we treat it through the whole process. And that has value in local markets.

MR. ROOT: I think that is a very astute observation. But the question I have is, will farmers do that individually, or will they do it through coops or closed coops or LLC's, and will they turn the management over to someone else of that operation and just continue to produce for it. How do you see that, Gene?

MR. NICHOLAS: Well, by and large, the bulk of the raw product, as the gentleman over here said, 80 percent of this production is produced from smaller family farms. And certainly in North Dakota, we've got 30,000 family farms. They grow the great bulk of that production.

We do not even have a corporate farm law in North Dakota. So for the foreseeable future, the bulk of this produce is going to be grown on those family farms. If those family farms are willing, as I said, to take a step further, towards integration, every bushel of my durum this year will move through my coop.

MS. HILLGREN: You know, this panel has not been talking enough about genetically modified crops, because stacked genes are going to give us all kinds of qualities that we don't even know, and there certainly is going to be a lot more contract production in every producer, and every food company is going to have to deal with it. There will be contract arrangements all over the place. We are really seeing a revolution.

MR. RUNDELL: Can I make a comment, because I've been critical of contract production? What I'm critical of is producers individually slicing each other to pieces. Because if you'll produce it for 15 cents, I'll do it for a dime because I'm bigger than you are and I can afford to do that on a commodity basis. Even a high-value crop that is going to be a commodity some day. I think what has to happen is, farmers that can catch the vision to put their capital and their resources together, their ability to grow and store and deliver IP products together.

Once you have that entity, you can go to the company that has the technology and say, we'll put together a system for you, but we want a piece of the value. We don't want to be chopped up for 15 cents a bushel. We want a piece long term of the value that is going to be in that high value crop. That's where we have to get. Otherwise, we are going to chop each other up for 15 cents a bushel, independent producers.

MS. HILLGREN: I don't know about people chopping each other. I mean, I think that the market will, indeed, do that. And the price value of value-added crops is already declined. It's declining all the time, because these value-added crops will become commodities.

MR. ROOT: Well, in saying that on the promotion and the marketing side, and seeing a decline that was called for earlier today on this year of as much as 27 percent, and also noting that a couple of the check-off by commodity groups are under review, one being the soybean check-off,

the other one being somewhat of a hostile move on the beef check-off, do you think that those check-offs are going to become victims of the low prices and dissatisfaction of farmers who can't get a market for their product at the price they want?

MR. NICHOLAS: Well, Ken, let me tell you what we are doing in North Dakota. I am a cosponsor of a bill. We have a wheat check-off. We currently have eight mills. We are increasing that to 10 mills. And we are going to earmark those two mills specifically for the wheat commission. And North Dakota farmers are going to pay for this. It is going to raise probably a million to a million and a half dollars per biennium, to be used specifically to fight for trade policies that are favorable to North Dakota farmers. And I see this expanding into other states like Minnesota, South Dakota, Montana, perhaps Kansas and Nebraska.

I think states are going to have to go together, because we have very unfair trade policies right now for the U.S. farmer. When we see the European Community subsidizing barley into the West Coast at a buck and a half a bushel, that's more than I can get for feed barley in North Dakota.

MR. ROOT: Mr. Trantham, you are contributing to the dairy check-off, are you not?

MR. TRANTHAM: That's correct.

MR. ROOT: Would you rather spend the money yourself, or just not have to pay it? Or would you like to pay it in support of a program that has obviously got a lot of recognition across the country?

MR. TRANTHAM: Well, I certainly am supportive of stimulating production and sales, of course. But I think where the real problem lies is who gets in charge of where it is to be spent.

During a tremendous surplus era of dairy, some of that money was used to do some research and work on BST. I think that brought tremendous ill feelings towards the dairy farmers, that we would actually take money out of that program to do something like that. I think that was very wrong.

So I believe that's the answer to it. I believe if these funds are used for that person's commodity and it is controlled by the farmer, I am very supportive of it. I think we need to promote our products. But I don't think it should be left too loosely as to what can be done with the money.

MR. ROOT: Do you use BST?

MR. TRANTHAM: No, sir.

MR. ROOT: Why not?

MR. TRANTHAM: It is an expense that doesn't bring any return back to me, like 12 Aprils grazing.

MR. ROOT: Okay. So it is a matter of economics?

MR. TRANTHAM: One of the matters is economics, yes, sir.

MR. ROOT: Well then, wouldn't it be logical that if you were to work on a promotion or a production technique with that kind of money, and then the producer has the choice of whether he takes it or not, that was still a good investment?

MR. TRANTHAM: Well, it would have been for the company that was making the product. I don't think it should have come from all the dairy farmers. I don't think that was something that was in the rules and regulations, that money could have been used for. When we farmers hear that it is used for something else that it wasn't supposed to be used for, that is what really tears the program down.

MR. ROOT: Question over here, sir?

QUESTION: Yes, I was curious as a member of one of the multinationals, is there some way that our companies could partner with you to improve the value to you on your end? I know we are a cause to you, but we would like to maybe partner with you on the other side.

MR. ROOT: The fear, I think, some people have of partnering with you when you are real big is that you always win.

MR. NICHOLAS: I think there is a lot of interest in partnering with you, if there is something in it for the farmer. It is very simple.

MR. RUNDELL: I think from a smaller nature, if farmers eventually don't get their name on shelf in some fashion, if we are not identified with your brand name, whatever it is I don't know what company you represent--but if your name is on the shelf and we are not there beside you, we ultimately lose.

We've got to be able to market the very strength of American agriculture, which is quality, very specific characteristics and traits of crops that are going to be identity preserved. Can we market that through your company? If so, we would love to partner with you. But make sure that you recognize, we want a piece of the partnership that is going to be long term in value.

You've spent billions of dollars putting your name on the shelf and buying the retail shelf space. We need to be partners with you at that point as well. I think U.S. Premium Beef is a good example. In the beef business, they've raised \$70 million dollars. You are going to hear from them this afternoon at 3:00. And they are putting their product on the shelf in a partnership with Farmland Industries.

There are real opportunities to do that, but you have to understand what we want. And I truly say this, if farmers are willing to sell out for 15 cents a bushel, long term, then that would be to your best advantage to do that, rather than put a partnership together. But I think there are farmers out there that will be able to be very good partners for you, and really deliver value, not just talk about it.

MR. ROOT: I think Lynn makes a very good point. As we move forward in the food chain, the farmer's share of the shelf space, let's take the Super Values, the Krogers, they are all putting their shelf space and more of their own product on the shelf. The branded labels are losing

shelf space. So the successful coop is the one that is going to be able to put his raw product into the Super Value or the Kroger's box.

MS. HILLGREN: Well, there has been an incredible proliferation of brands from companies, all the global companies, all the local companies. In the 90's, it has just been phenomenal. That's why there is more pressure on the shelf space, and the grocers are charging more and more for that shelf space. I'm not sure that some of these farmer owned coops will be able to fight in that arena.

MR. RUNDELL: Yes, I think that there is a point there. One has to be realistic about the marketplace that you are looking at. When you look out there today, you'll find that the top four chains in the retail side and the grocery store side have already 30 percent of that market.

When you look at up and down the food system, it's not clear that you have the wherewithal to suddenly introduce yourself into that marketplace. And I think there is a need to be cognizant of using that capital in the best way to get as much value out of that system as you can. It may not necessarily mean it has to be at the retail level, but you can still buy pieces of that food chain. To say, "I'm going to put something on the shelf with my label on it," in this marketplace today, is simply being unrealistic in terms of capital required.

MR. ROOT: Mr. Trantham, a last comment?

MR. TRANTHAM: Yes, sir. I would like to make an exact statement.

Kraft Food dominates almost 80 percent of the cheese in the industry. And yet they can go to Green Bay, Wisconsin, and bid on cheese and take my price down immediately, just by bidding on cheese at that time.

In fact the dairy department in the grocery store chain is the highest profit department in the entire chain: \$12.80 per linear foot for dairy products. The closest thing to it is \$8.60 per linear foot for frozen food. So I would love to have you play on my side and get me into that \$12.80 range, and not lowering my price by bidding on cheese in Green Bay, Wisconsin.

MR. ROOT: Have you ever heard of Braums Dairy Stores in Oklahoma and surrounding states?

MR. TRANTHAM: Yes, sir. I have. They are excellent.

MR. ROOT: One dairyman who has taken this to over 100 stores, and sells it directly, and there is nobody but him from the cow to the cash register.

MR. TRANTHAM: Fabulous, fabulous story.

MR. ROOT: Let me stop with the questions at this point and ask our panelists to make one final comment, either an accolade or an admonition to American agriculture. And if they will, a prediction of something major within marketing or marketing strategies that will happen in the next 10 years, 20 years. I'll give them 20. Most of you will be around for 20. Well, not all of you, but some of you will be around for 20. And we'll see if it comes true.

Mr. Doyle, this time we will start with you.

MR. DOYLE: I'll be very brief. I have seen at least a couple of cooperatives that have done well in the branded business. They are closed cooperatives. They are recognized nationally, and their brands compete well. So there are those who can have a long term view and execute the strategy, and it has worked very well when they have done so.

I do think that the trend of consolidation will continue at an every-increasing pace, and especially if there are smaller producers who want to remain in agriculture in a very active way. They are going to have to align themselves or partner with someone, or be fully dedicated to a cooperative structure to compete. And that's not to say it can't be done, but certainly it will have to reflect a major change from where we are today.

MR. ROOT: That was your prediction, that what's happening now is going to continue to happen at a higher speed?

MR. DOYLE: Yes, vertical integration will be at an exponential pace.

MR. ROOT: Very comforting. Mr. Barr?

DR. BARR: Well, as far as an admonition, I guess that would be to spend a little bit more time understanding what that market is that you are supposedly building a strategy around. Understand where that ultimate market is.

As far as a 20-year forecast, if agriculture is going to be prosperous and a growing industry in 20 years, I think you will see U.S. agricultural production capacity become integrated into the self-sufficiency strategies of major foreign buyers through binding delivery contracts.

MR. ROOT: All right. Thank you. Mr. Trantham.

MR. TRANTHAM: I feel that the industrialization and the small family farm will still be the leading factors in agriculture. But what I would say is, I have a definition for sustainable agriculture:

There will be more pressure applied to Congress and to this country than ever before in the next 20 years, to clean up our act and have a quality product. So my definition for sustainable agriculture over the next 20 years is to provide through the sale of our agricultural products the ability to maintain the quality of the air, water, soil, crops and animals, and an economic value to our families, communities, state and nation. In turn we will disburse the greatest wealth in America to millions instead of to an extreme few.

MR. ROOT: All right. Lynn Rundell, your comment and prediction.

MR. RUNDELL: Well, net farm income for the average U.S. farmer is around \$40,000. Of that, \$35,000 for the average farmer comes from off the farm, and \$5,000 is truly from the farm. The answer to that problematic equation is not to get another spouse and double your farm income. The answer is to create more value by adding more value, true value to the system you have already invested in by owning at least the next step up. Owning a portion of at least the next step up in processing agriculture; seeing farmers as not just producers but also processors; reading the Milling and Baking News, instead of just Farm Journal. That's where farmers have to get to.

MS. HILLGREN: Whoa.

MR. ROOT: Okay.

MS. HILLGREN: We have a new magazine entitled Global Agri-Business that deals with the world market.

MR. RUNDELL: Okay. But my prediction is that in the next 20 years, you will see an organization formed, from Michigan to Texas, that will include up to 20,000 farmers who have the same vision, to become partners in the food business. That will have brand label recognition, with partners in the food business.

MR. ROOT: Okay. Eugene Nicholas.

MR. NICHOLAS: My prediction is that in the next 20 years, the only farmers that will survive are those that are totally integrated; totally integrated on your production, whether it be in spring wheat products, putting it in the form of a bagel or a bread stick or whatever. And in the durum, you are going to have to integrate into this industry.

You are seeing much more integration into the pasta industry, and I think it is going to happen at a much more rapid rate. We have to export two-thirds of the wheat out of this country. And if we are going to continue to be competitive in those world markets, we are going to have a high degree of Federal involvement to stay competitive. I don't see the Federal Government getting out of agriculture as much as some at this conference might like to think it is going to get out. It has to be there if we are going to compete against foreign governments.

MR. ROOT: And Sonia, we started with you. We would like to end with you.

MS. HILLGREN: I want a totally, totally blue sky. I think 20 years is a really, really long time with the speed of change that we have. And I would commend you to reading a four part series called "Global Contagion" in last week's New York Times. You can find it on the Internet at the nytimes.com site

We really have to fix this global economy. There are strategies for dealing with the global economy, but all of us are very much effected by it. I think we might have perhaps three currencies, and we are just going to have capital running around like crazy.

And I think that U.S. producers and U.S. closed coops are going to be dealing in different parts of the U.S. and different parts of the world. Gene is sort of shy here, but he is involved in some production in different parts of the country. And he works with somebody who produces in North Dakota and in Latin America. And this is one of the ways we are going to protect from the vagaries of weather and markets.

I do think it is important to say that, this panel was very tilted toward coops. And I grew up in South Dakota. I understand this. We like coops in the Plains and in the upper Midwest. But in fact, individual producers, they don't like it. You are talking about 20,000 producers. There are a whole lot more than that.

They are all dealing with, "What is going to be my relationship with these agri-businesses?" There will be a lot of contracts. And there will be a lot of efforts by the people who can market really, really well using hedging and everything else who are going to be the survivors.

MR. ROOT: And your singular prediction? Did you just make it and I missed it?

MS. HILLGREN: My prediction was, we are going to have three global currencies.

MR. ROOT: Three global currencies. Will the dollar be one of them?

MS. HILLGREN: Dollar, Euro and Yen.

MR. ROOT: Okay. In closing I would like to thank our panel for their frank and open comments. I know a lot of you came a long ways today, and I do appreciate it.

MICRO DYNAMICS OF INCOME, DEBT MANAGEMENT AND FARM FINANCIAL PERFORMANCE

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Recent world events have illustrated that farming is a global business. During the latter half of 1998, the U.S. experienced substantial price declines for many agricultural commodities. These market developments were largely unanticipated and particularly difficult to accept on the heels of the unusually high price levels experienced during 1996-97. World stocks of grains and oil crops remain quite high and there are no imminent signs of increasing demand. While there is cause for concern regarding the financial outlook for commodities that have been traditionally viewed as major contributors to the farm economy, it is easy to overlook positive developments in other segments of agriculture. Livestock producers have benefited from low grain prices in the form of cheaper feed. Cash receipts for poultry and eggs are expected to approach \$24 billion in 1999, almost three times what they were in 1980. Similar, but less dramatic growth has occurred for the vegetable, fruit, tree nut, nursery, and greenhouse subsectors, where their combined receipts should eclipse \$40 billion in 1998. These commodities have not only grown steadily over the last 20 years, but they also represent a larger share of total receipts in agriculture.

The forecasting activity that supports USDA's outlook for the farm economy is designed to give a national picture of where things are headed. Before contemplating the implications of the financial outlook for agriculture, a brief review of 1998 is provided for context. A presentation of 1999 forecasts and the longer-term outlook as it relates to USDA's Baseline follow this. We then turn to the primary focus of this paper, which is to reconcile the broad perspective for the national farm economy with the diverse mix of farms and farm households that comprise the sector. Two unique classifications of farms are developed which comprise factors that are argued to most influence differences in financial performance among farms. Using these alternative frameworks we explore the micro dynamics of income, debt management, and financial performance based on USDA's Baseline projections for the 1998-2003 period.

Closing the Books on 1998

1998 was a year of wide swings in financial circumstances for farmers and the economic health of the sector. At this time last year our net farm income forecast of \$42 billion anticipated a financial downturn in the agricultural economy. We highlighted producers specializing in the production of wheat, corn, cotton, and hogs as the industry sectors most likely to encounter difficulty. By late spring, wheat harvest problems in the Northern Great Plains were evident. With prospects for larger harvests during the summer, attention turned to grains and oilseeds. Farmers in the South, particularly cotton producers, experienced weather adversity in 1998 from drought, hurricanes, and flooding. Finally, producers have endured dramatic declines in prices received for hogs.

Production flexibility payments and loan deficiency payments under the 1996 Act, combined with supplemental support from the provisions of last fall's appropriation bill, provided nearly \$13 billion in direct income assistance. These direct payments, \$5.4 billion more than paid in 1997, combined with reductions in expenditures for inputs and increased receipts in some commodity sectors provided a footing for sector-wide earnings near \$48 billion. At this level, net farm income would be down \$1.8 billion from 1997 and \$5.4 billion below 1996's record. In terms of the balance sheet, current evidence suggests that annual debt expansion in recent years slowed in 1998. We anticipate that even with some evidence of declines in the latter part of the year, land values increased for the year, but at a slower pace. Given the importance of the balance sheet to the overall financial health of the farm sector, we look forward to 1998 land value estimates based on a survey of farmers that will be released by the Department next month.

Near and Long-term Outlook for Production Agriculture

The financial outlook for U.S. agriculture remains favorable, despite recent price collapses for many commodities. Net farm income for 1999 is forecast at \$44.6 billion, near the 1990-97 average of \$45.5 billion (*figure 1*). Additional government support coupled with relatively stable production expenses and improvements in receipts for some commodities (notably livestock, cotton, fruit, and nursery and greenhouse products) will soften the adverse impact of low grain prices on 1999 calendar year net farm income. In large part, the strength of the farm economy is derived from stability of the balance sheet. Assets are expected to continue to increase in value, though at a slower rate than for the previous five years. Growth in farm sector debt is expected to level off, perhaps even decline a modest amount, halting a six-year period of annual increases. Farmers' equity in agricultural assets is expected to increase for the tenth straight year totaling more than \$900 billion at year-end 1999 (*figure 2*).

Net farm income from 1998-2008 is expected to average modestly higher than during 1990-97, but is unlikely to reach the 1996 record again during the projection period (*figure 3*). However, lower farm commodity receipts, particularly crop receipts, lead to declining net farm income from 1998 to 2000. Given the baseline price and production projections, crop cash receipts will bottom out in 2000, begin rising in 2001, and continue to grow through 2008. Livestock receipts are also expected to grow from a 1998 forecast of \$93.4 billion to \$118 billion by 2008. Lower production expenses should help offset lower receipts in the near term, but the long-term trend is toward modestly rising costs. As an indicator measuring the solvency of the farm sector, the debt-to asset ratio will remain favorable for 1998-1999 and is forecast to decline continually through 2008 (*figure 4*).

Farmers Use of Repayment Capacity to Rise in 1999 and Beyond

Farmers are expected to use their available credit lines more fully in 1999, and throughout the 2000-2003 period. Lenders generally require that no more than 80 percent of a loan applicant's income be used for repayment of principal and interest on loans. For farm operators, income available for debt service (measured in the sector accounts as net cash income plus interest expense) can be used to determine the maximum loan payment the farmer could make while satisfying typical debt coverage ratio requirements. Using current bank interest rates and a 7-year

repayment period, maximum feasible debt conceptually measures the line of credit that could be available to farmers.

Net cash income averaged almost \$60 billion during 1997-98. It is expected to fall below \$57 billion in 1999 and decline further to less than \$53 billion in 2000. Net cash income is anticipated to remain in the low- to mid-\$50s for the 2000-2003 period. As a result, the maximum feasible debt that farmers' could service with current income is expected to decline by more than 11 percent from 1998 to 2000 (*figure 5*). Slightly improving incomes after 2000 are expected to increase farmers' potential credit lines by about 5 percent by 2003. After declining slightly in 1999, total farm operator debt is projected to rise gradually so that by the end of 2003 it stands about 11 percent higher than at the end of 1998. Farmers' unused borrowing capacity is anticipated to decline during 1998-2003, as farm debt rises faster than repayment capacity.

Farm debt repayment capacity utilization (actual debt expressed as a percentage of maximum feasible debt) effectively measures the extent to which farmers are using their available lines of credit. This ratio indicates that farmers are expected to use almost 57 percent of the debt that could be supported by their current incomes in 1999. Effects of expected favorable interest rates and reduced debt in 1999 will not be sufficient to offset the impact of lower net cash income. The persistence of lower income, relative to 1997-98, is expected to produce a steady rise in farmers' use of debt repayment capacity during 2000-2003, despite anticipated modestly rising debt levels and relatively favorable interest rates (*figure 6*).

What Can We Glean From the National Outlook?

Even with low prices for many commodities, USDA's outlook for the farm economy remains somewhat optimistic. This situation, to some, represents an irresolvable contradiction. For example, one might wonder how we can forecast \$2.00 corn and at the same time suggest that the farm sector will remain financially sound.

POSTULATE 1: The financial outlook for U.S. agriculture in total can be very different than the perspective for any particular industry segment.

Given the diversity of businesses that make up the production agriculture sector, there can exist pockets of financial distress even when the sector as a whole is viewed as financially sound. The likelihood of such an event is heightened when financial difficulties stem from low commodity prices as opposed to input cost increases, which tend to have broader impacts. Corn, soybeans, and wheat represent less than one-half of total crop receipts and therefore any changes in prices for these commodities have a somewhat limited impact on total crop receipts (*figure 7*).

POSTULATE 2: Even within industry segments there is a continuum of financial performance.

Not all farms that are similar in structure and commodity emphasis earn equivalent profits. Looking at economic cost for farms that specialize in the production of corn suggests that farms across the size spectrum were able to generate returns in excess of all economic costs, including a return to the operator's labor and management. These farms are represented by the dots below the economic breakeven line in *figure 8*. Thus, the impact on farms and farm households of

changes in either economic conditions at home or abroad, or in policy actions focused on specific issues, may be very different depending upon the production and financial organization of the business, and household decisions with regard to allocation of their time and resources.

Recognizing that differences in aggregate financial performance exist and that these distinctions are difficult to grasp from the sector outlook, it is important to focus on factors that influence variability. We find it useful to examine two primary sources:

- 1) natural resource characteristics and
- 2) individual decision making and management ability.

Agriculture's Micro Dynamic Diversity

The U.S. farm sector consists of a highly diverse set of businesses and farm households committed to living in rural areas and engaging in farm economic activities. Farms range from the more than 800,000 largely self-contained small scale businesses that are operated by retirees, residential and lifestyle farmers to farms that tend to be more industrial in organization, featuring complex management and business decision frameworks and a wide assortment of linkages to other farm and non-farm businesses. Since the early 1900's, U.S. Department of Agriculture analysts have sought to identify patterns in U.S. farming that might further the understanding of differences in the financial performance of farms and the economic well-being of farm households. The climatic, soil, water, and topographical base of a geographic area tend to constrain the number and types crops and livestock that are well adapted. County clusters, based on types of commodities produced, have shown that a select few commodities tend to dominate the production landscape of geographic areas that cut across traditional political boundaries.

Recently, this work has been extended to show correspondence between geographic regions based upon physical and environmental characteristics of the land area and regions based upon commodity mix and production decisions. Farmers' decisions about the use of resources, including their financial and natural resource base, are influenced by several factors. Among these are the goals held for their businesses and for their households, career choices, including how to allocate work hours and managerial talents, and stage of development, growth, and life cycle, both for the business and for farmers themselves. To more carefully capture differences among farms and farm households, two classifications of farms have been developed to reflect resource, economic, and demographic attributes of farms and areas. These classifications, one a resource-based regional delineation, and the second a farm typology based on occupational choice and sales volume, provide more homogeneous groupings of farms and farm households for use in assessing the distributional effects of changes in the farm economy.

Resource-based Regional Delineation's

The Economic Research Service has used regional groupings of states and counties to present its farm structure and financial information for many years. Typically, regional groupings have followed traditional political boundaries, primarily for state or multi-state areas. Regions that cut across state boundaries have been developed and included in research reports focused on measuring and reporting agriculture's diversity. More recently, spatial modeling techniques have

been used to determine how key financial and policy indicators are distributed across the geographic landscape. Previous work has provided little insight about the inherent physical and environmental production capability of areas. The regions reported in this paper merge information about characteristics of land areas with information about types of commodity production to generate geographic areas that, while cutting across state boundaries, are more homogeneous with regard to both resource and production activities (see text box for region definitions).

How does the 1999 forecast portion across resource regions?

The brunt of financial difficulties stemming from cash flow problems anticipated for 1999 fall on three regions, the Heartland, Mississippi Portal, and Northern Crescent (*figure 9*). In each of these regions, the decline in average net cash income ranges anywhere from 11 percent (Northern Crescent) to 18 percent (Heartland). These regions were not the most susceptible to financial difficulties arising from cash shortfalls. This magnitude of a decline in net cash income would be much more problematic if it were to occur in the Northern Great Plains or Prairie Gateway regions. These regions began 1999 with 8 percent of farms in a vulnerable financial position and another 13 percent of farm businesses with debt representing more than 40 percent of assets.

Farm businesses located in the Heartland region, particularly those with corn and soybeans as their primary commodities, will experience the most severe cash flow problems in 1999. Given the current forecast of continued low commodity prices for corn and soybeans, net cash income is expected to be 18 percent lower than 1998 and 35 percent below 1997's average of \$50,555. More than one in four farms will not earn enough income to cover expenses in 1999, which is 10 percentage points higher than for 1997. The impact of cash flow problems, while significant, will be more difficult to manage for the region's 6 percent of farms that have the combination of negative income and high debt levels. These vulnerable farm businesses will need to quickly address the shortfall in earnings by liquidating inventories or tapping other working capital, selling off machinery and equipment, or perhaps subsidizing farm losses with off farm income or savings. Those without sufficient equity to manage the problem will need to restructure loan terms and as a consequence reorganize their operation.

Mississippi Portal farm businesses are also expected to experience cash flow difficulties in 1999. Lower receipts for cotton and soybeans and reduced government payments result in a 13 percent decline in average net cash income between 1998 and 1999. In 1999, 18 percent of the region's farm businesses are not expected to cover cash expenses compared with 16 percent in 1997. The share of vulnerable farms could reach 7 percent by 1999.

The situation in the Northern Crescent region is somewhat unique among regions with more than a ten percent decline in average net cash income between 1999 and 1998. This was one of the few regions where 1998 net cash income was above 1997's value, thanks in large measure to higher milk prices. The combination of falling milk prices in 1999 and relatively low grain prices will result in an 11 percent decline in net cash income. For this region, 1999 net cash income is not much below 1997's average of \$50,268. With 1999's lower cash income, the share of farm businesses with negative net cash income increases by only two percentage points.

What does the long-term financial picture look like in the various regions?

USDA's baseline projects declining income for the farm sector during 1999-2003, but not all

regions are expected to experience similar trends. Most regions averaged at least a five percent annual increase in net cash income calculated over the 1993-98 period, with the Fruitful Rim (15 percent) and Mississippi Portal (12 percent) regions leading the way (*figure 10*). Of course, record earnings in 1996-97 contributed significantly to this trend. Even with relatively high earnings during 1996-97 average net cash income remained fairly constant in three regions, the Northern Great Plains, Basin and Range, and Heartland. The regional outlook for net cash income over 1998-2003 suggests that cash flow problems are likely to persist in the Heartland, and Northern Great Plains regions. The annual average change in net cash income approaches minus five percent in each of these regions, with each region establishing new lows in net cash income by 2001. In the Heartland region, average net cash income does begin to increase slowly after 2001. As a result of persistent lower incomes in these regions, farm debt will remain fairly high relative to that which can be repaid from current income. Farmers are projected to continue using available credit lines fully in both regions. In the Northern Great Plains, debt repayment capacity utilization remains above 70 percent during 2000-2003. While this measure improves in the Heartland, it stays above 60 percent throughout this period (*figure 11*).

A significant negative rate of change (-3.9 percent) in net cash income also occurs in the Mississippi Portal region. In contrast with other regions that are expected to have declining income, average net cash income never falls below the previously established regional low of \$56,700 in 1995. The regional diversity of financial circumstances exhibited in the forecasts is also evident in the result that both the Fruitful Rim and Eastern Uplands have a positive annual change in average net cash income. Average net cash income is expected to remain near 1998 levels in the Southern Seaboard region. Another distinct pattern of change in net cash income which is characterized by variability is exhibited in the Northern Crescent region where average net cash income declines through 2000 and increases back to 1997 levels by 2003.

Implications of declining income over 1999-2003 range from the notable deterioration in overall financial performance in the Heartland region to relative stability in the Eastern Uplands. To some extent, the degree of financial problems that arise from cash flow adjustments depend on the beginning financial strength of businesses, the magnitude of decline in income, and duration of the downward trend. Two of these factors went against the Heartland region. The impact of declining incomes would have been much more severe had not this region started the period with one of the highest percentages of farms in a favorable financial position (72 percent).

Structural Typology

Both the number and size of farms and the socioeconomic characteristics of farm operators and resource owners are among the key dimensions of farm structure.¹ Indicators of farm size have normally drawn on some measure of physical size of operation or some measure of economic output. The Nation Commission on Small Farms recently defined a small farm as a farm with sales of less than \$250,000. Choices with regard to farm organization, financial structure, commodity mix, production systems and practices, and allocation of resources among farm and non-farm activities are influenced by characteristics of the farmer and his or her household. ERS has

¹ Other key dimensions of structure include the degree of specialization in production and organization of the farm firm, ownership and control of productive resources, and barriers to entry.

developed a typology of farms that jointly considers the economic size of business and occupational decision of farmers with less than \$250,000. Recognizing both farm and farm operator attributes enables us to partition farms that are operated by a person who considers himself or herself to be retired from farms that are more actively engaged in production. Farms operated by persons who consider their primary occupation to be in a non-farm occupation can also be treated separately. Finally, farms that are either limited in their resource base or whose primary occupation is farming can be considered. (See text box for definitions).

How does the 1999 forecast breakout across these groups?

Changes in average household income in 1999 are expected to come from a decline in household income from farming rather than off-farm income, where the forecast reflects a continued strong performance in the general economy. The most serious cash flow adjustments for farm households occur for Large Family Farms (primary occupation farming and gross sales of \$250,000 to \$499,999), small farms with sales between \$100,000 and \$249,999 whose operators report farming as their primary occupation (Farming Occupation/Higher Sales), and farm households of the Very Large Farms. These farm typology groups are projected to have declines in average household income from 1998 of 15 percent, 11 percent, and 8 percent; respectively. The decline in household income for the other typology groups is forecast between 2 percent and 4 percent (*figure 12*).

What does the long-term financial picture look like for different groups?

Most typology groups averaged at least a 4-percent annual increase in household income over the 1993-98 period. Limited-resource farms were the only typology group that had a negative average annual change in household income (-0.68) over this 5-year historical period (*figure 13*). Large swings in household income from farming for the Large Family Farm group kept the annual average change in household income below 2 percent. The longer-term outlook suggests that farms most dependent on the farm business for income will experience the largest declines in household income. The Large Family Farm typology group is estimated to have annual average change in household income of minus 3.6 percent during 1998-2003. Average household income bottoms out at \$56,400 in 2001 and begins to increase slowly. Small farms with sales between \$100,000 and \$249,999 whose operators report farming as their primary occupation (Farming Occupation / Higher Sales) also had relatively large negative change in annual average household income over the period. In contrast with Large Family Farms, average income for the Farming Occupation/Higher Sales typology group does not fall below the low in household income established in 1994 of \$36,500.

What Does Diversity Suggest for Performance of Sector Subgroups during 1999 and beyond?

Farmers and ranchers produce in highly a competitive global marketplace. The past year's economic events and large harvests in both customer and competitor nations emphatically made this point. Global events have had a wide range of impacts on U.S. farms and on regions of the country. The agricultural sector is becoming more diverse, producing food and fiber, fuels, medicines, and industrial products. New environmental regulations, energy policies, and new technologies contribute to the diversity of the sector. Farms are diverse as well. ERS research has illustrated how changes in structure and performance vary across a continuum of farm sizes,

farm organizational structures, and farm populations. While the economies of most places in the United States are not dependent on farming, the welfare of rural communities can be significantly affected by changes in the sector. Research indicates that actions farmers take to control costs are key elements for them to be able to compete and operate their business with successful outcomes.

We need to build on this work to provide information helpful to farmers in making decisions about production systems and practices potentially useful in lowering costs, and conserving production and financial resources.

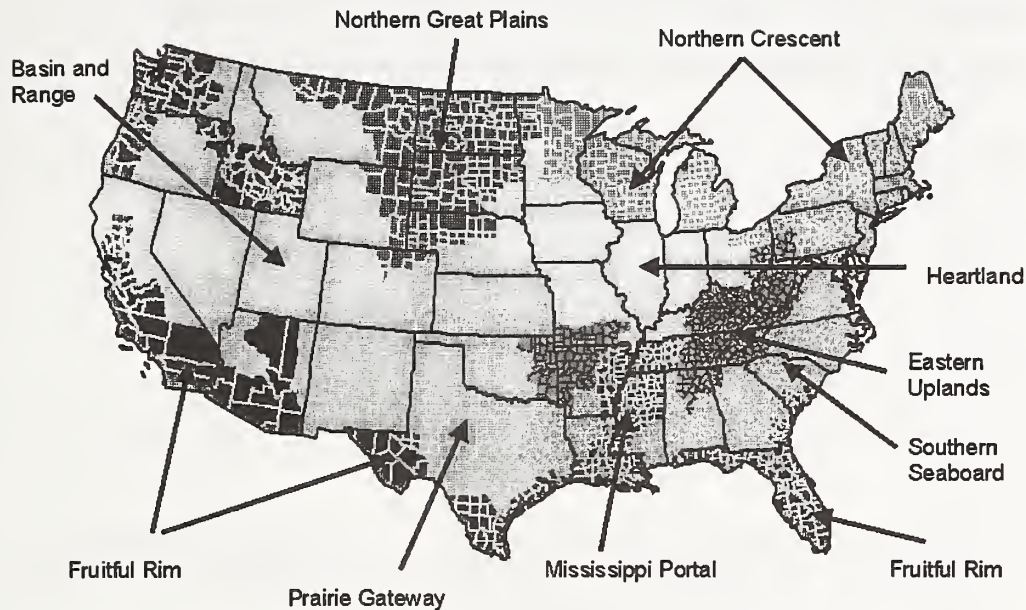
End-Note

Stay tuned for quarterly updates since this is a year when prices, input costs, and other factors that ultimately affect farm finances are subject to considerable change as we move through the year.

Geographic Areas Based on Land Resource Regions and Commodity Clusters

- **Northern Crescent.** Dairy farms were 17% of farms in 1997. Other major farm types included general field crop (23 %) and cash grain farms (19%). Area had 9% of U.S. cropland; slightly more than proportional acreage in corn, soybeans, and specialty crops. Most populous region.
- **Eastern Uplands--**15% of nation's farms but only 5% of the value of production. Beef farms most prevalent type (48% of farms). Tobacco, general field crop, and other livestock were also prominent. Region has 6% of U.S. cropland. 60% of farms had sales of less than \$10,000 in 1997.
- **Southern Seaboard--**11% of nation's farms and 9% of value of production in 1997. Two-thirds of farms were livestock farms. Beef farms most common type followed by general field crop and other livestock. Area covered 6% of Nation's cropland, but is over represented in rice, cotton, and specialty crop acreage. Region has 11% of U.S. population.
- **Heartland--**More than 20% of nation's farms located here, accounting for 23% of the value of production. Region has more than 25% of U.S. cropland, and the largest concentration of corn, soybean, and sorghum acreage. Cash grains and field crops dominate (3 of each 5 farms). Hog farms are also more common than elsewhere.
- **Mississippi Portal--**5% of farms and 4% of value of production in 1997. Beef farms were most common (44% of all farms). Cotton, rice, mixed crop and livestock farms were also common to the region. Region has 4.9% of cropland, but more than proportionately represented in cotton and rice.
- **Northern Great Plains--**Characterized by nation's largest farms, measured by acres operated. Cash grain, field crop, and beef farms are 95% of all farms. Region has 17% of cropland; more than proportionately represented in wheat, barley, oats and specialty crops.
- **Prairie Gateway--**Second highest share of U.S. cropland (19%). Tied with Northern Great Plains in wheat, oats, and barley acreage (35%) and is second behind Mississippi Portal in rice and cotton acreage.
- **Basin and Range--**4.5% of nation's farms and 4% of value of production in 1997. Features second largest farms based on acres operated. Beef farms were the most common farm type (41%). Farms growing high value crops 2nd most common (13%), followed by general field crop operations. Cash grains were 10% of farms. Region has 4% of cropland despite a large land area due to federal land holdings.
- **Fruitful Rim--**8% of cropland but 32% of specialty crop acreage and 21% of rice and cotton acres. Region has largest share of large and very large family operations as well as a large share of non-family farms. Over 37% of farms specialize in production of high value crops.

Resource Regions



The Farm Typology

Small Family Farms (sales less than \$250,000)

1. **Limited-resource farms.** Any small farm with: (1) gross sales less than \$100,000, (2) total farm assets less \$150,000, and (3) total operator household income less than \$20,000. Limited-resource farmers may report farming, a nonfarm occupation, or retirement as their major occupation.
2. **Retirement farms.** Small farms whose operator's report they are retired. (Excludes limited-resource farms operated by retired farmers.)
3. **Residential/lifestyle farms.** Small farms whose operators report they had a major occupation other than farming. (Excludes limited-resource farms with operators reporting a nonfarm major occupation.)
4. **Farming occupation/lower-sales.** Small farms with sales less than \$100,000 whose operators report farming as their major occupation. (Excludes limited-resource farms whose operators report farming as their major occupation.)
5. **Farming occupation/higher-sales.** Small farms with sales between \$100,000 and \$249,999 whose operators report farming as their major occupation.

Other Farms

6. **Large family farms.** Sales between \$250,000 and \$499,999.
7. **Very large family farms.** Sales of \$500,000 or more.
8. **Nonfamily farms.** Farms organized as nonfamily corporations or cooperatives, as well as farms operated by hired managers.

Figure 1
Net Farm Income To Decline in 1999

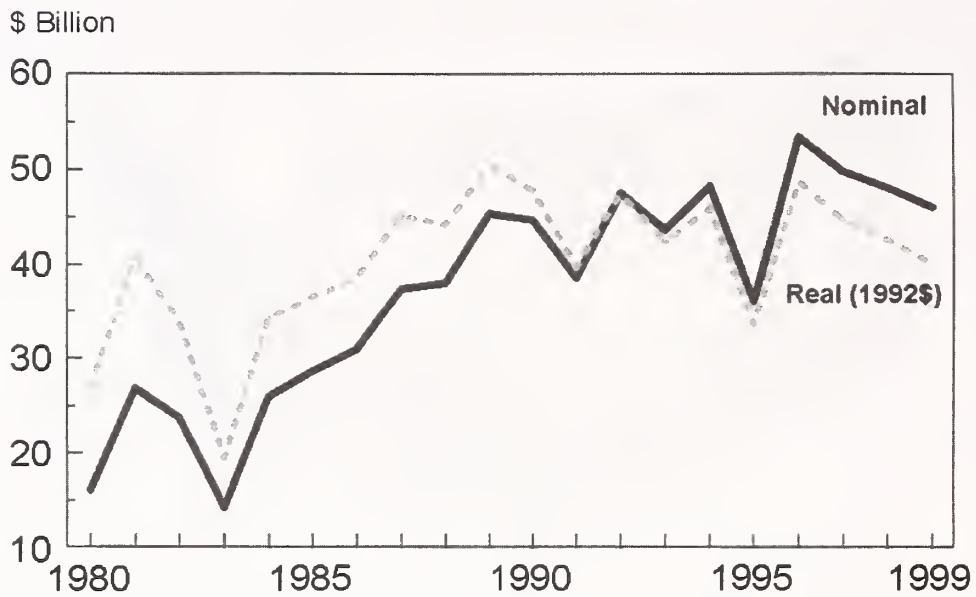


Figure 2
Farm assets, debt, and equity
Equity increasing since 1986

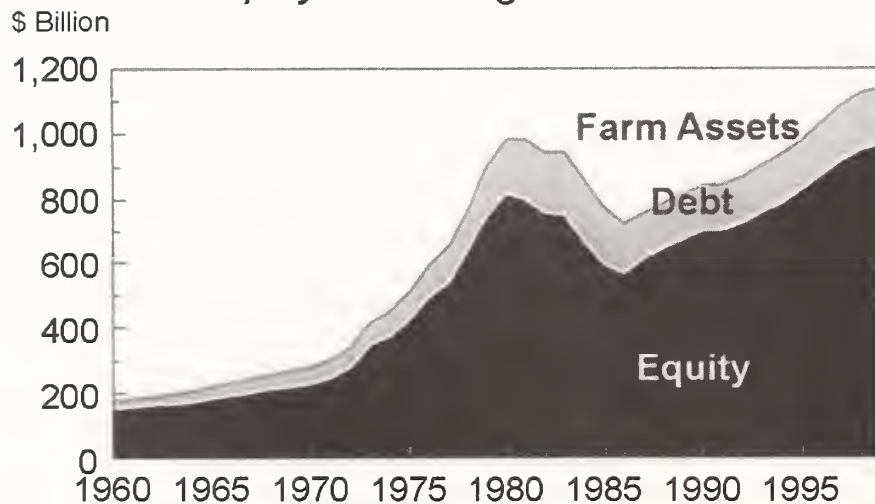
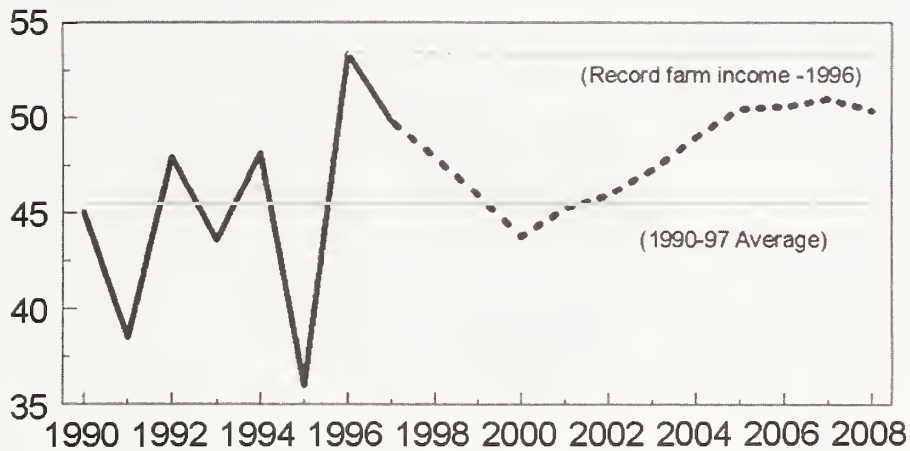
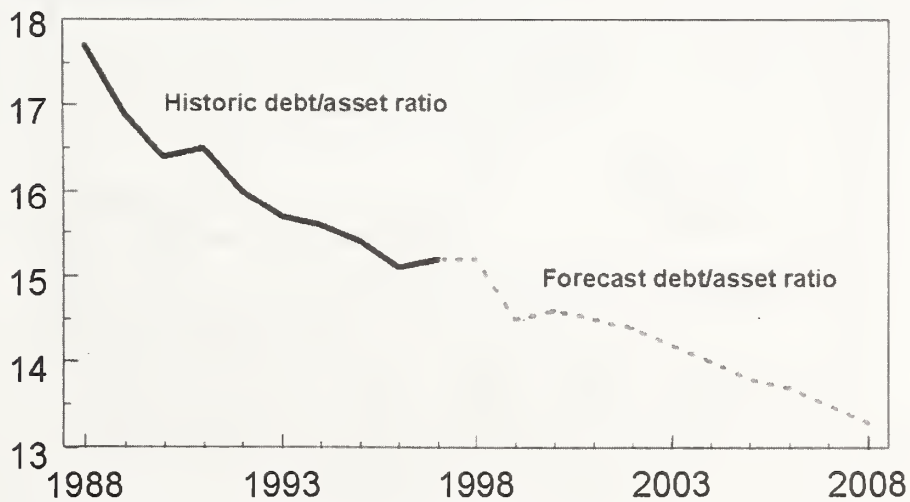


Figure 3
**Projected 1998-2008 modestly higher than 1990-97
 average, but below record farm income in 1996**
 \$ Billion



Source: Economic Research Service, USDA.

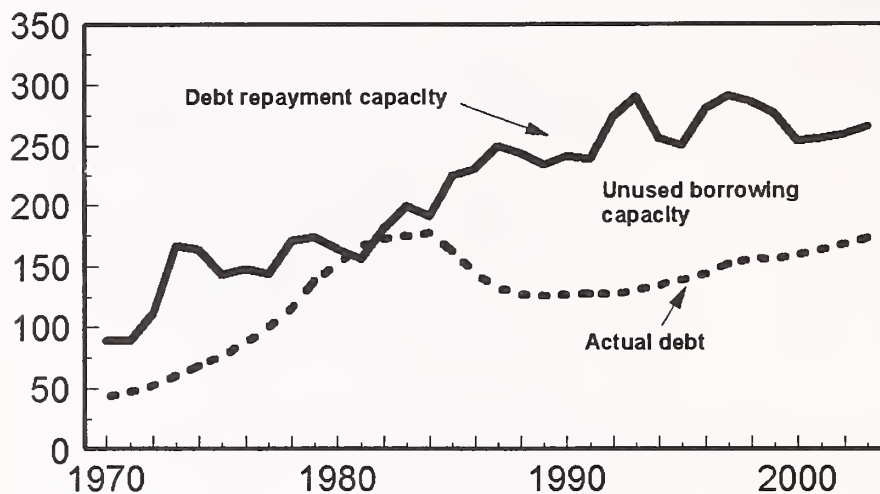
Figure 4
Debt-to-Asset Ratio, 1988-2008
Favorable in 1998-99, and forecast to decline through 2008
 Ratio



Source: Economic Research Service, USDA.

Figure 5

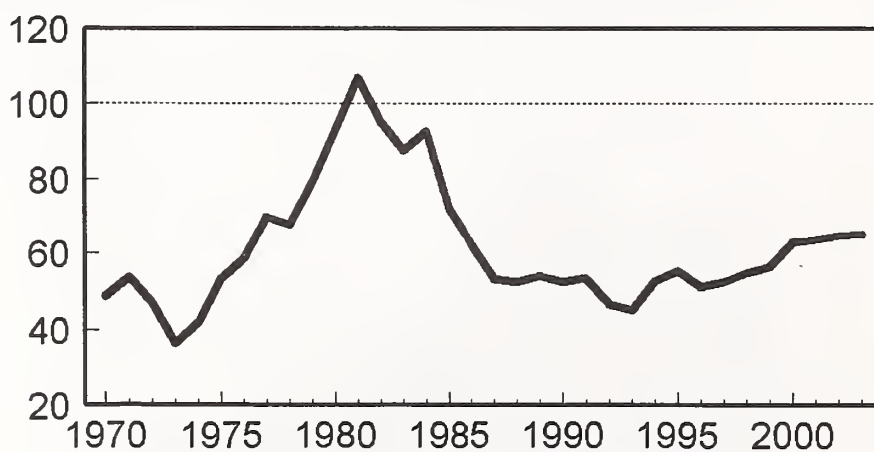
Farm operators' still have substantial borrowing capacity available, despite recent rise in actual debt
\$ billion



Source: Economic Research Service, USDA.

Figure 6

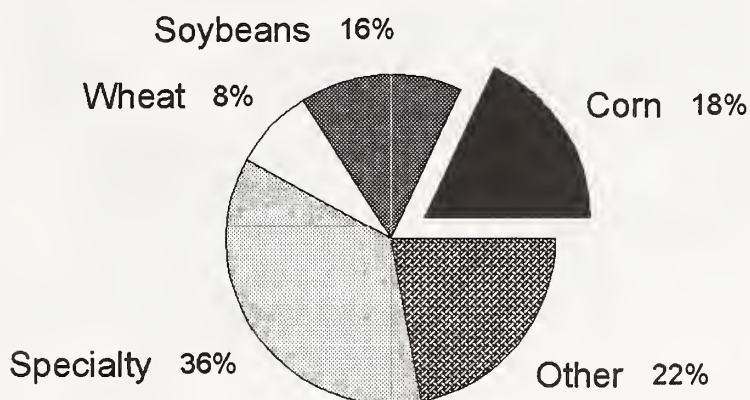
Debt repayment capacity utilization, 1970-2003
Percent



Note: Actual debt compared with a hypothetical maximum debt that could be carried based upon repayment capacity.

Source: Economic Research Service, USDA.

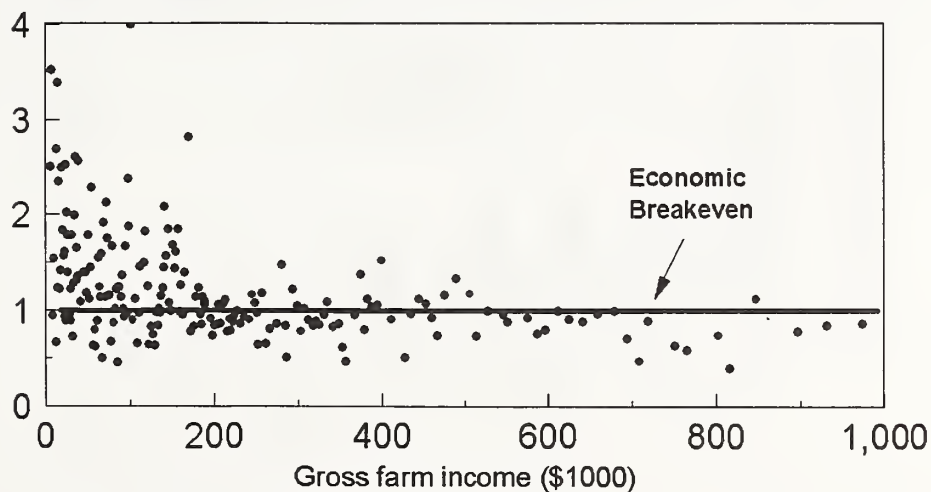
Figure 7
Commodity shares of total crop receipts, 1997



Source: Economic Research Service, USDA.

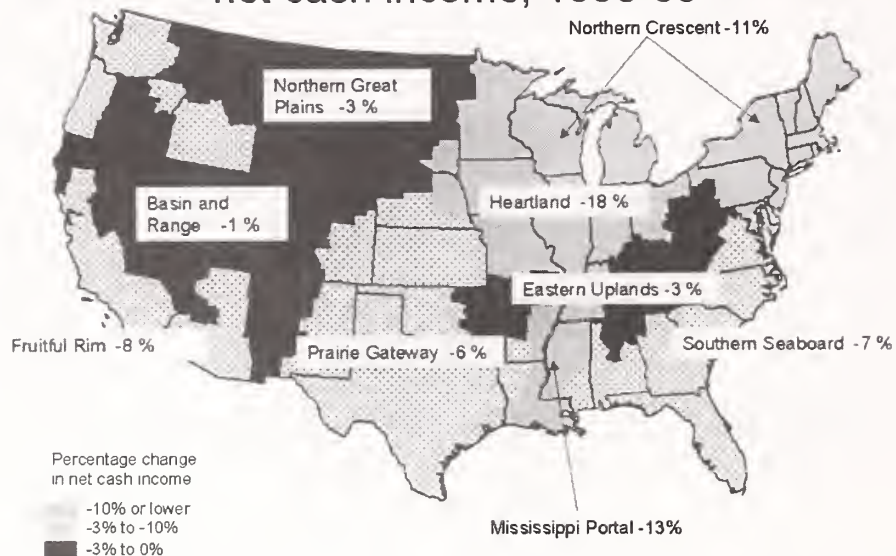
Figure 8
Economic costs per dollar of gross cash income for farms that specialize in corn production, 1997

Economic costs



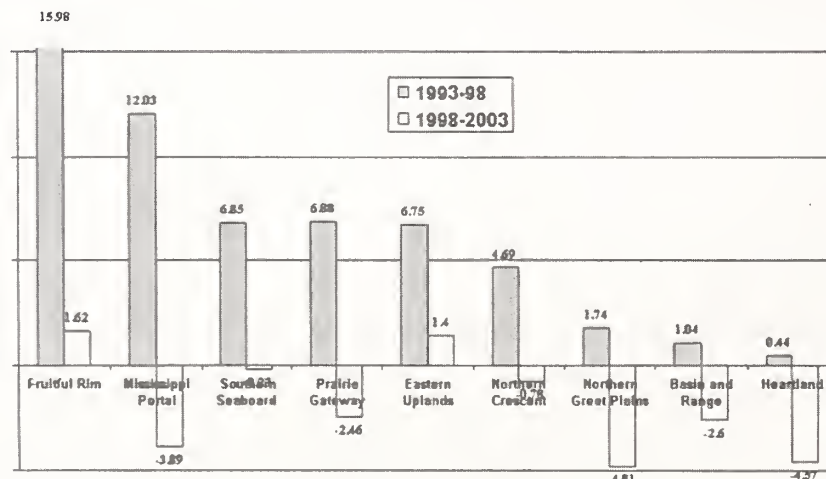
Source: Economic Research Service, USDA.

Figure 9
Percentage change in projected average
net cash income, 1998-99



Source: Economic Research Service, USDA.

Figure 10
Annual average percentage change in projected net
cash income for the 1993-98 and 1998-2003 periods

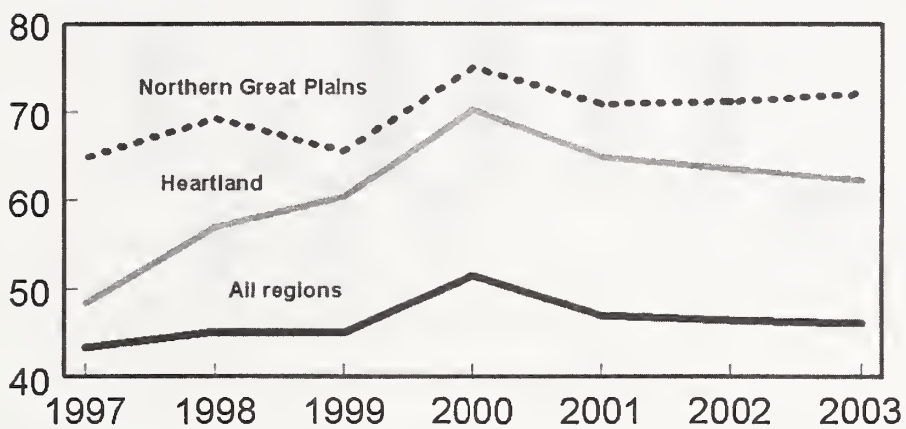


Source: Economic Research Service, USDA.

Figure 11

Debt repayment capacity utilization higher in Heartland, Northern Great Plains, 1997-2003

Percent

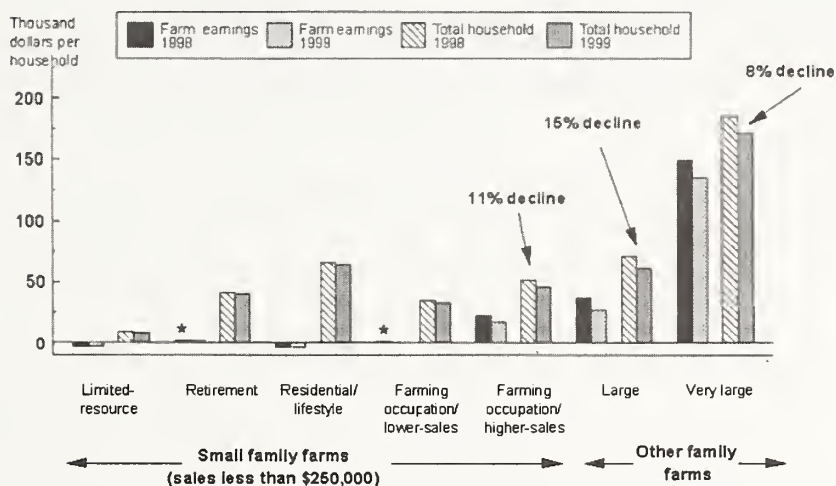


Note: Farms with sales greater than \$50,000

Source: Economic Research Service, USDA.

Figure 12

Projected average operator household income by source and by farm typology group, 1998-99

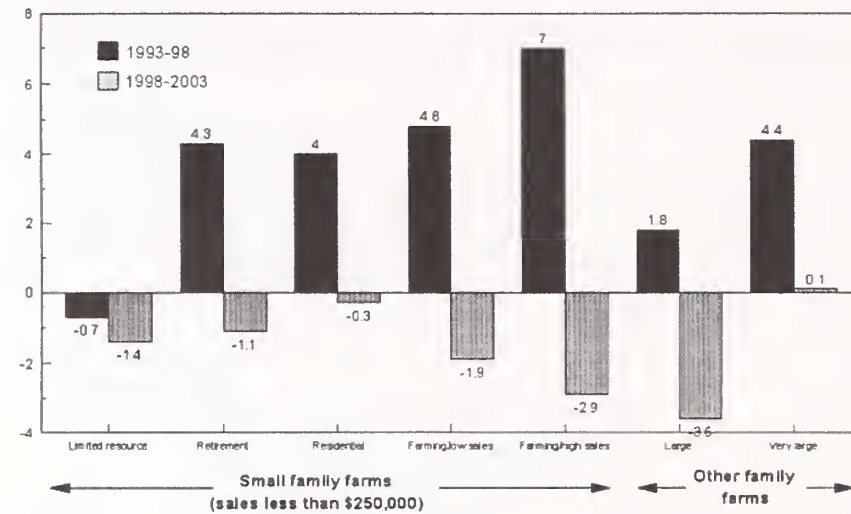


* = CV for the farm earnings estimate is greater than 75 percent

Source: Economic Research Service, USDA.

Figure 13

Average annual percentage change in projected household income for the 1993-98 and 1998-2003 periods



Source: Economic Research Service, USDA.

ADJUSTMENTS IN BUSINESS AND PRACTICES:
HOW FARMERS CAN IMPROVE THE BOTTOM LINES IN TODAY'S FARM ECONOMY

Michael D. Duffy
Extension Economist
Iowa State University

Introduction

Good afternoon! I appreciate the opportunity to be with you today. In the time I have allotted I would like to share with you some of the responses I have seen to the low commodity prices and some possibilities that I am recommending to Iowa farmers.

I am an Extension Economist in farm management at Iowa State University. The examples that I will use come from Iowa. However, I think that they will be similar to the situations and responses seen in other Midwestern states.

One of my jobs for ISU Extension is coordinating the Farm Financial Management Program which started in Iowa in 1983 as a response to the farm financial crisis that was occurring at that time. We have kept the program active and today it represents one of ISU's primary responses to the current farm financial situation.

The Farm Financial Planning Program consists of trained Extension associates who work one-on-one with individual farm families and use the computer program FINPACK. However, the Farm Financial Planning Program is more than a simple computer analysis of the farm finances. The associates are also trained to work with the families in helping to identify alternatives, seek out other sources of information and help and, in general, provide a neutral third party to work with the farm family.

Currently there are 15 of these associates throughout Iowa. In addition to their part-time work with Extension, the associates are also active farmers. Some of the associates have been with the program since the beginning and others are new this year.

My work with the associates and their comments will form the basis for some of what I want to share with you today. Their insights often help me as I work with the broader issues facing the agricultural community.

Before discussing some of the business and farm practice adjustments that we are seeing, I would like to share with you some observations on the situation and where we stand currently. Although the low commodity prices affect everyone, it is apparent that some are

being more adversely impacted than others. As one of the associates commented, "there are haves and have-nots".

Two important factors influence the impact and adjustments to the current financial situation. First, the past few years have been very good income years. High corn and soybean prices and the passage of the Federal Agriculture Improvement and Reform (FAIR) Act led to a general feeling of euphoria throughout Iowa. There was a feeling that "with the government off our backs" and the unveiling of major trade opportunities, agricultural fortunes were going to improve substantially. A second factor that influenced the adjustments to this period is the rapidly changing structure within the production sector. This is especially true in pork production but there also are changes in cropping due to genetic alterations, grain contracting and other events.

These two factors caused a more pronounced reaction to this downturn in production agriculture. The bubble burst very rapidly and many producers are asking themselves if they even want to be participants in the new environment.

The current downturn in the farm economy first surfaced during early to mid- summer 1998. One indication was land values. In May, participants at the 72nd ISU Soil Management and Land Valuation Conference projected a 15 percent increase in land values for the year 1998. For the past ten years, the participants' prediction has been within 3 or 4 percent of the values reported in the ISU Land Value Survey. This year the ISU survey showed a 1.9 percent decrease in values, rather than the 15 percent increase that had been projected.

The mood of farmers at ISU Experiment Station field days at the end of August was very somber. However, record or near record yields, coupled with the extra government payments, helped improve the mood, at least for the cash grain farmers. For farmers with swine the situation deteriorated throughout the year, ending with the lowest hog prices ever seen.

The collapse in the farm economy led to questions about the failure of FAIR and whether we were returning to a situation similar to the 1980s. There also has been considerable bantering about how serious the situation is and what, if any, should be the appropriate response at both the state and federal levels. There were emergency funds provided to agriculture and there have been many proposals for helping the farming community in general and swine producers in particular.

One ISU study by Jolly and Vontalge, based on data from the Iowa Farm Business Association, used farm level data and a ranking scheme that looked at both the cash flow and the return to equity. This study showed that as many as one-third of Iowa's farmers could go out of business within the next two to three years. The Association mainly represents Iowa's full-time family-sized farms. It doesn't have the very large farms, but it also does not have the small farms.

In spite of this study, it is difficult to ascertain the extent of the financial problems caused by the current situation. One of the associates likened the situation to a "deer in the

headlights", that is, people are just kind of paralyzed. They aren't seeking help or taking any action because they just aren't sure what to do or how serious the situation really is at this time. Some land auctions reports that there is still a strong demand for farmland. This would indicate that there are still farmers and investors who have money and believe in the capacity of farmland to generate an adequate return.

Regardless of how serious you think the situation is today, the key is going to be how long the low commodity prices last. If the current low prices persist for the next year or so, the number of people severely impacted will continue to rise.

Adjustments

Four categories of adjustments are occurring. I will discuss each of these categories separately, but I do not have an estimate of the percentage or number of farmers falling into each category.

Some farmers are simply quitting and they can be divided into several different groups. Some are quitting simply to preserve the equity they have left. For a variety of reasons these farmers do not see a future in agriculture, or at least not a future for them. Rather than continue to farm and lose equity, they are choosing to exit now and pursue other employment alternatives. These are either middle-aged farmers with other alternatives or older farmers at retirement age.

Another group quitting farming are those who have acquired debt loads that their current operation is not able to support. This debt could have been incurred due to expansion, inefficient operations, or a variety of reasons. Regardless of the source of the debt, the farm simply cannot continue to operate.

A second response category contains farmers making major changes in their operations by dropping or adding enterprises. This is characteristic of swine producers. The months of red ink and the less than rosy prospects have made a number of swine producers look carefully at their position and interest in remaining in the swine industry.

It is very difficult to make general statements about who is exiting and who is staying in the swine industry, at least at the level we would normally consider as family farms. Three examples illustrate this point, and these are all people with whom I have worked in the past two or three months. One was a middle-aged producer with low cost of production in old, unconventional facilities. He had many other opportunities, and he viewed his choices as staying with the pigs and losing money until the price improved and then spending the rest of his career getting back to where he was today, or quitting now and keeping the crops while doing something else. That was the path he chose. Another instance was a young couple who wanted to stay with the swine industry, primarily through producing specialty pigs. They chose to delay purchases, maintain existing facilities, basically trying to ride out this period of low prices. Finally, the third producer was a younger man who had within the past three years invested considerable money into expanding his hog facilities. He was simply trying to persuade his lender to stay with him until things improved.

There are many other examples of people who dropped particular enterprises in response to the current farm economy. Some producers are eliminating the farrowing and simply using their existing facilities for contract finishing of someone else's pigs. Some are trying to direct market or market their products through joint enterprises.

As noted earlier, another response category of farmers are those who are simply not doing anything and hoping that the situation will improve or that they will be able to survive the current round of low prices. It is important to remember these categories of farmers when thinking about a "sitting tight" strategy and what it foretells. Many farmers are part-time or retired farmers, other farmers are in a very strong equity position. As long as the price is above the cash cost of production, they will keep producing and not be too concerned. Problems may arise when they have to replace equipment or when they realize they are not earning a competitive return on their equity, but they simply enjoy farming and will continue to do so as long as it doesn't cost too much. The fourth category of farmers is trying to make adjustments in their production practices and in their financial arrangements to help them survive this current period.

A common reaction has been to "rebalance the balance sheet". For a variety of reasons, including an increase in credit card use and credit purchases, farmers today find themselves with a substantial amount of short-term debt. In other instances, rolling debt is accumulating because prices don't even cover the cash costs of production. This debt is not on any fixed type of payment schedule. Regardless of the source, many farmers are scheduling debt on a note to reflect the actual position and obligations of the farm. This debt is often secured with intermediate-term assets.

There are many other adjustments occurring in production practices, one of which is the number of trips across the field. For a variety of reasons, there has been a decrease in the use of conservation tillage. Reducing trips not only saves the soil; it saves expenses as well.

Pest management options are another area where farmers are adjusting their practices. Over the past few years, we have seen a dramatic drop in the use of row cultivation as a weed management option with herbicides used as a substitute. In times of low prices, the ability to decrease cash costs often outweighs the desire to save labor.

Farmers are doing less of their own spraying. In 1996, over 40 percent of Iowa's corn and soybean farmers did not apply any herbicides themselves and used custom applications. There are a variety of reasons for this, and while it may be the best approach for some people, it does represent an area where there is room for savings.

Fertilizer use is another area where considerable savings can be achieved. Over 80 percent of the corn acres receive phosphorus and potassium. However, two-thirds of the soils tested in the Iowa State Soil Test Lab rated high to very high in P and K. Research has shown that there is no yield response to adding P and K to these soils. By use of soil testing, farmers will be able to determine the level of nutrients available and whether or not P and K applications will be cost effective.

Planting rates is another area for savings. The recent trend, especially in soybeans, has been to narrower rows or drilling along with higher plant populations. Again, research has shown that regardless of the row spacing, there is a level of maximum plant population above which there is no yield response. Many Iowa farmers are using planting rates above these levels.

In addition to the typical types of adjustments that can be made to reduce the costs of production, farmers are also increasing their use of the risk management tools. Today there are a variety of new insurance programs that were not available to farmers just a few years ago.

Conclusions

The severity of the current situation is being debated. However, for some producers, the situation is very serious. The key to how widespread the problems will become is how long the current round of low commodity prices lasts. The longer it lasts, the more people that will be drawn into the serious financial situation.

Farmers are responding in different ways. For some, simply fine tuning their operations appears to be the best approach. However, for others, the situation has deteriorated to the extent that their ability to continue in production agriculture is doubtful.

Some farmers are responding with fairly drastic changes in their farming operations. They are dropping enterprises or changing the way they market their products. Others have yet to make changes for a variety of reasons.

Over the past 45 years, there has only been one year (1981) where the average management return for the highest one-third profit group in the Iowa Farm Business Association was negative. That year was believed by many to be the start of the farm financial crises of the 1980s. Initial results from the Association for 1998 show that there is a strong likelihood that the year's average management return will be negative. The 1998 Iowa State Land Value Survey showed the first drop in land values in 11 years. Only time will tell whether or not these indicators presage another widespread financial crisis. Regardless, farms will have to make adjustments and one of the biggest is the change in attitude. We must start using the good times to even out the bad times. Farmers must also begin making adjustments based on their individual circumstances. There is no one "best" way to do something, and each individual farm has its own unique set of goals and resources. We must use this knowledge to make our decisions and adjustments.

Farm Credit Conditions During the Agricultural Contraction of the 1980's and Now

Robert N. Collender

Senior Financial Economist, Economic Research Service

U.S. Department of Agriculture

While agricultural conditions in the last decade have in some ways been similar to those contributing to the boom and bust cycle of the 1970's and 1980's, important differences exist. Among the similarities are the role of agricultural exports, changes in the foreign exchange value of the dollar, adverse growing conditions followed by strong increases in production, and sustained increases in farm asset values and farm debt. Important differences include the role of interest rates and inflation, more conservative use of leverage by both farmers and lenders in recent years, and the more limited duration and amplitude of the recent up-cycle. Several factors could aggravate the current down-cycle, including some loss of off-farm opportunities, weather, foreign financial crises in importing countries and other exporting countries, and the unknown degree to which lenders may choose to reduce their exposure to creditworthy agricultural borrowers.

Introduction

The recent deterioration in many commodity prices following several years of healthy gains in farmland values and debt levels has led to speculation that agriculture could be entering a contraction similar to that of the 1980's. Prices for many key agricultural commodities (especially grains, oilseeds, and hogs) have fallen dramatically over the past 2 years. Preliminary 1998 real net farm income is lower than for 4 of the preceding 5 years, and net farm income is forecast to deteriorate further in 1999. Some have characterized the anticipated crisis as a "credit crisis," because lenders may balk at extending loans to agricultural borrowers who cannot demonstrate solid repayment ability. The degree to which low incomes create financial hardship depends on the initial financial strength of the farm, how far income falls, how long income remains low, and the decisions that farmers and lenders make as events unfold.

This paper begins by exploring the similarities and differences between credit conditions during the early 1980's and those currently facing agricultural borrowers by assessing such factors as the financial health of borrowers, the overall economic environment, and the financial strength of lenders. Subsequent sections review the conditions that helped spawn the 1980's crisis for production agriculture and for major agricultural lenders. This review concentrates on average indicators of financial performance of farmers and lenders.¹ The current cycle and current conditions are summarized and contrasted.

¹For information about the current distribution of distress among farm borrowers see the soon to be released article, "Who Holds Operator Farm Debt?," by James T. Ryan and Steven R. Koenig.

A Review: 1970's Boom, Perverse Economic Incentives Led to 1980's Bust

The Boom. Commodity prices surged from 1973 through 1975 and remained high through 1979 (fig. 1). During this period, farm incomes (fig. 2) and rates of returns on assets from current income and from real capital gains (fig. 3) were unusually large. The initial surge in farm incomes has been attributed to a variety of factors including a major change in the foreign exchange regime (in 1972 the U.S. abandoned the fixed exchange rate regime that had been in place since the end of World War II) accompanied by a devaluation of the dollar (fig. 4), adverse weather in competing production regions, and increases in effective demand for agricultural products abroad (fig. 5). The increase in farm income, readily available credit (fig. 6), rising inflation, and low to negative real interest rates (fig. 7) led to a bubble in farmland values (fig. 8) and sustained increases in farm investment in machinery and equipment (fig. 9).

The strength of the farm economy encouraged expansion and supported rising land values, but so did economic forces beyond the farm sector. Rising inflation and relatively low nominal interest rates supported increases in farmland values and in farm indebtedness. While financial assets lose value with inflation, real assets gain value. This fact encourages investors to shift their holdings from financial to real assets, exacerbating the value loss for financial assets and increasing the gain for real assets, including farmland.

In addition, low real interest rates (nominal interest rates less the rate of inflation) encouraged debt financing, since debt could be repaid in cheaper, inflated dollars as it came due. As shown in fig. 7, real interest rates were low or negative during much of the 1970's. From the beginning of the boom in 1972 through the peak in land values in 1981, farm debt grew 15 percent faster than assets. Of course, the increase in asset values was widely dispersed, but the increase in debt was concentrated among those farmers who were financing new purchases of land or equipment. Because farmers had strong equity, rising incomes, and increasing collateral values during the boom years, they had little trouble getting loans and few farm loans were adversely classified by lenders. Given strong farm finances, lenders expected to recover both the balance due and all foreclosure costs in the event of a default (Peoples et al., 1992).

The Bust. By the end of 1970's, concern was rising about declining farm liquidity and exposure to cash flow or interest rate shocks. This vulnerability is illustrated by the increase in interest and principal payments from less than one-sixth (16 percent) of gross cash income in the early 1970's to almost one-fourth (24 percent) of gross cash income by 1980. Farmers, lenders, and economists were slow to realize the extent of needed adjustments, with many arguing that the contraction would be short and would involve shifting income from asset accumulation to debt service, while asset values remained sound.

By the early 1980's, many of the factors that spurred the boom were reversing: export demand and commodity prices fell, while many input prices, interest rates, and the value of the dollar rose, making U.S. agricultural exports more expensive for foreign customers. The nature of the boom made U.S. agriculture vulnerable to a downturn: many farmers who had bought land or made other long-term investments--especially those who used debt financing--now had difficulty meeting their other financial obligations or even making a living. Farmers had responded strongly to the perceived profit opportunities from increased production by bringing more land under

cultivation and by investing in productivity increasing technologies. These investments led to large increases in acres planted and in per acre yields.

Government policies during the 1970's years amplified the supply response. Many governments, worried about foreign exchange or food security issues, increased their support for agricultural production. Federal commodity programs encouraged increased production and indirectly encouraged increased farm borrowing. By setting price floors, commodity programs reduced the risk associated with farm income, making farm income a more attractive repayment source for supporting debt. Support levels increased during the boom period when raising them involved no immediate increase in Federal budget expenditures, further supporting incomes and borrowing.

Following inflation-fighting policy decisions by the Federal Reserve Board, nominal interest rates rose sharply in 1980, peaked in 1981, and remained high for several years (fig. 7). These high interest rates made dollar denominated investments attractive and caused the foreign exchange value of the dollar to appreciate. The monetary tightening successfully curtailed the double digit inflation of the late seventies--inflation peaked in 1980 and fell below 2 percent by 1986.

However, the high value of the dollar and high price floors on program commodities hurt the international competitiveness of U.S. agriculture and pressured farm incomes. The fall in real farm income and increase in real interest rates reversed the economic environment that had made debt financed investment in nonfinancial assets like farmland attractive, delivering a double whammy to heavily indebted farmers. Because the value of capital assets is directly related to the cash flows they generate and inversely related to interest rates, falling incomes and rising rates pressured farm asset values, which fell dramatically from 1981 through 1986.

Stress among Lenders

An important factor in the agricultural boom and bust was the behavior of agricultural lenders and their regulators. This behavior arguably accentuated the boom and aggravated the decline. According to the Federal Deposit Insurance Corporation (FDIC) most of the bank failures in the 1980's, a decade that saw more than any since the 1930's, were precipitated by four regional and sectoral recessions, including the one in agriculture (Federal Deposit Insurance Corporation, 1997). Banks were vulnerable to these recessions because they tended to serve relatively narrow geographic markets, but not all regional recessions caused failures. Generally, failures were associated with recessions in sectors that had experienced a fairly sustained expansion and had grown faster than the national economy. Agriculture was such a sector. Credit helped fuel the boom, but when the down cycle hit, some borrowers inevitably defaulted, weakening lenders. In contrast, recessions that were preceded by slow growth (such as in the rust belt), did not lead to many failures. Recessions that caused problems for lenders were similar in that each followed a period of rapid expansion, speculative activity (usually supported by expert opinions) that contributed to the run-up in asset values, and wide swings in real estate activity that contributed to the severity of downturns.

Lenders who found themselves in trouble had generally not been in a seriously weak condition in the years preceding the recessions. Lenders who failed often assumed greater risks than the survivors, as measured by ratios of total loans and non-residential real estate loans to total assets. But only a small fraction of lenders with high risk exposures failed. Mitigating factors included

strong equity and reserve positions, more favorable risk/return tradeoffs, superior lending and risk management skills, and proactive changes in policies regarding risk before losses became severe. Lenders that relaxed credit standards, entered markets where management lacked expertise, made large loans to single borrowers, or whose loan growth strained their internal control systems or back-office operations were most likely to fail. These factors were as much associated with distress among Farm Credit System lenders as they were with distress among commercial banks (Collender and Erickson, 1996).

The greater a lender's exposure to agriculture, the more trouble defaulting farm loans caused. Life insurance companies and large banks were least affected because of the relatively small share of their assets related to agriculture. Even many rural banks were adequately diversified: while 328 of 5,000 agricultural banks existing in 1981 failed in next 10 years, on average, return on equity for agricultural banks never fell below 5 percent and capital-to-asset ratios improved over the decade, even though they were already higher, on average, than at other banks (Peoples et al., 1992). Farm Credit System (FCS) lenders faced greater challenges because their loan portfolios were not diversified either by geography or by industry, and because of organizational and operating inefficiencies (Collender and Erickson, 1996).

The roots of the banking, thrift, and FCS crises were in the 1970's like those of the agricultural crisis. Increased instability in banking, as in agriculture, arose from the change in the exchange rate regime, rising inflation, volatile nominal interest rates, and anti-inflationary Federal Reserve Board monetary policies. And as in agriculture, there were few obvious signs of trouble for lenders in 1980. At small banks (those with less than \$100 million in assets) and FCS institutions, returns on assets and returns on equity were good, equity-to-asset ratios were improving, and loan charge-offs were low.

Parallel of Current Conditions to Early 1980's Limited

Some experiences of the past few years are astonishingly similar to the agricultural cycle of the 1970's and 1980's, while other aspects are very different. The similarities start with the nature of the more recent up-cycle. It followed the earlier pattern of rising agricultural exports during a period of tight stocks due to production controls and unusually bad weather in many growing areas worldwide. This combination led to high prices and optimism about future income from farming which, along with falling interest rates, supported farmland price increases. Recent increases in farm indebtedness add to the sense of *deja vu*. The beginning of the down-cycle has further parallels: policies that imposed supply controls on agricultural production have been relaxed, foreign demand has diminished in the face of financial crises that started in Asia, the dollar has appreciated relative to other currencies, and the carryover stocks of grains and oilseeds are increasing.

Despite the similarities, many factors are substantially different. In contrast to the early 1980's, the farm sector and its lenders are much less vulnerable to economic instability, and the domestic economic environment is much more stable. Farmers and farm lenders have used leverage more conservatively in the last few years than they did in the 1970's. Off-farm income has been an important alternative source of farm repayment capacity for many years (Harrington, et al., pp. 49-54). Because overall economic growth has remained strong and unemployment in most parts

of the country is low, off-farm opportunities are better in many parts of the country than during the years of stagflation and recession of the late 1970's and early 1980's.

While indicators of farm sector financial strength have deteriorated, the current situation differs from that of the early 1980's in a very important way. The monetary tightening by the Federal Reserve Board and the vulnerability of farmers and lenders to interest rate changes were defining characteristics of the 1980's crises. While interest payments and principal payments consumed 22 percent of gross cash income in 1979 rising to 28 percent by 1983, they currently consume only 14 percent. And, while low commodity prices and farm incomes create concerns about loan repayment ability, low nominal interest rates have continued to support asset values, including farmland, rather than pressuring them. The farm sector and farm lenders are much less vulnerable to increases in nominal interest rates, and because inflation is relatively low, any such increases are likely to be small compared with those of the 1980's.

Both the duration and amplitude of the recent up-cycle are compressed compared with that of the 1970's. Nominal net farm income rose 30 percent in 1972 and 77 percent in 1973 after a long period of stability (fig. 10). Over the next 5 years real net farm income averaged 16 percent higher than during the five year period before the 1972 increase. In 1996, net farm income rose 48 percent from 1995, but 24 percent over the average of the previous 5 years, and this increase is not expected to be sustained for even a few years. Growth of real debt and growth in land values, while supported by a similar combination of factors, have not compared in magnitude (figs. 5 and 8) to that of the 1970's. Much less of the recent increase in farm assets has been debt financed. From 1990 to 1998 nominal farm assets increased 34 percent, while nominal farm debt has increased 23 percent. In contrast, debt increased 4 percent faster than assets from 1972 to 1979 and 15 percent faster from 1972 through 1981.

Advice from financial experts has also been more temperate in the 1990's than it was in the 1970's. Both farm economists and financial regulators have consistently warned that liquidity from "Freedom to Farm" payments would support higher land prices initially, but had potential to fall as these front-end loaded payments tapered off. In contrast, experts in the 1970's and early 1980's encouraged farmers to expand production and increase debt loads.

Farm lenders as a group are less vulnerable to downturns in the sector than they were in the 1980's. Consolidation and financial innovations (securitization, third party guarantees, options, and swaps) have enabled many lenders to reduce their risk exposure to local economic conditions and interest rates changes. Lenders are also subject to closer scrutiny now from their Federal regulators. Regulatory changes, including risk-based capital standards, risk-based insurance premiums, and prompt corrective action, increase the costs to lenders of allowing credit quality in their loan portfolios to deteriorate. Many lenders have higher capital ratios, better quality capital, and better internal controls than during the 1970's and 1980's.

While Current Conditions Do Not Match Those of the 1980's, Further Deterioration Is Possible

Many of the events and conditions supporting recent gains in farm income and asset values parallel events and conditions that occurred in the boom years of the 1970's. Also, many of the

conditions that led to the dramatic fall in many commodity prices during 1998 are similar to those that produced agriculture's contraction in the 1980's. Nonetheless, important differences exist that point to a sector better able to withstand adversity and less likely to be as dramatically tested. Greater domestic economic stability, a less pronounced expansion, and more conservative use of leverage by farmers and their lenders all should reduce the magnitude of any contraction.

That said, two other observations bear further discussion: First, individual experience varies more than sectoral averages, and many farmers and farm lenders will certainly face financial stress and difficult decisions. Second, a number of factors could aggravate the current downturn. For example, some lucrative and traditional off-farm employment opportunities may disappear, especially in energy producing States. Changes in government policies could strengthen the dollar or encourage greater agricultural production. Favorable weather here or abroad could increase price pressure on major commodities. Continued demand shocks in food importing countries or weakening of currencies of other agricultural exporters like Canada, Australia, and Brazil could further erode agricultural exports. And, changes among agricultural lenders and their regulators could affect lenders' willingness to lend to creditworthy farmers during a contraction.

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Figure 1

Index of Real Prices Received, 1983=100

Index

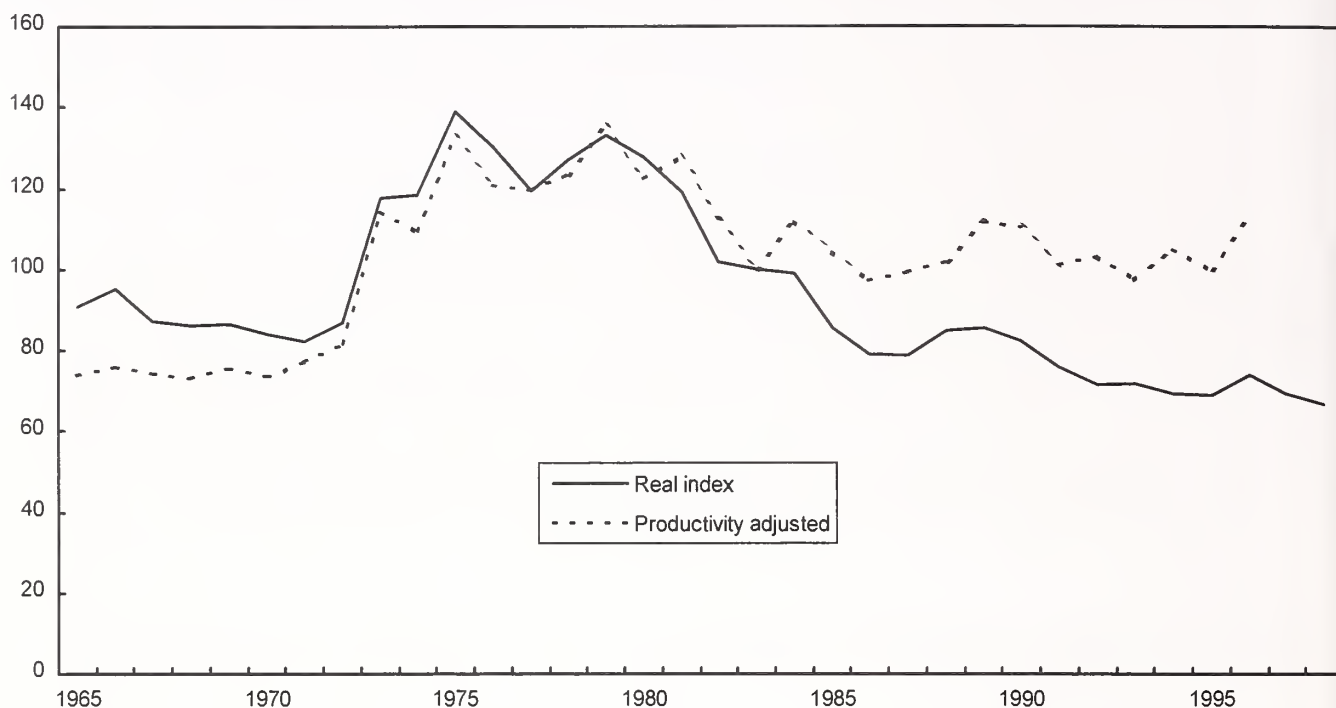


Figure 2

Real net farm income and direct government payments

\$ billion

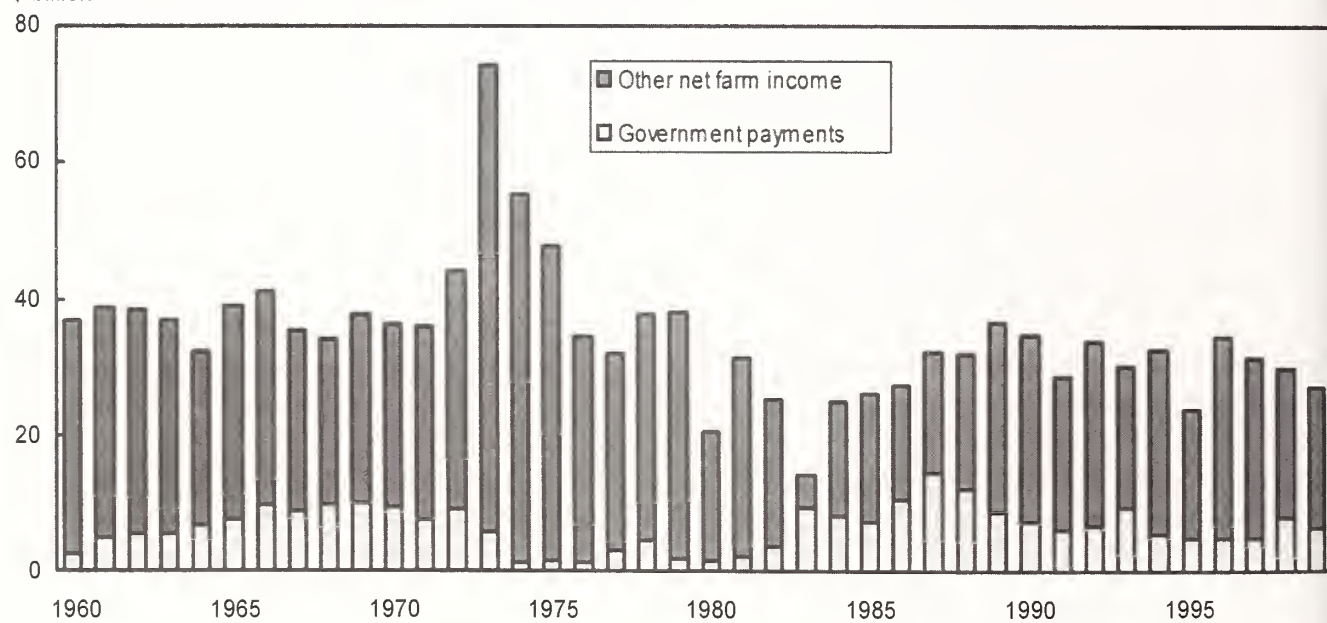


Figure 3
Return on assets in farming, 1960-1999
 Percent

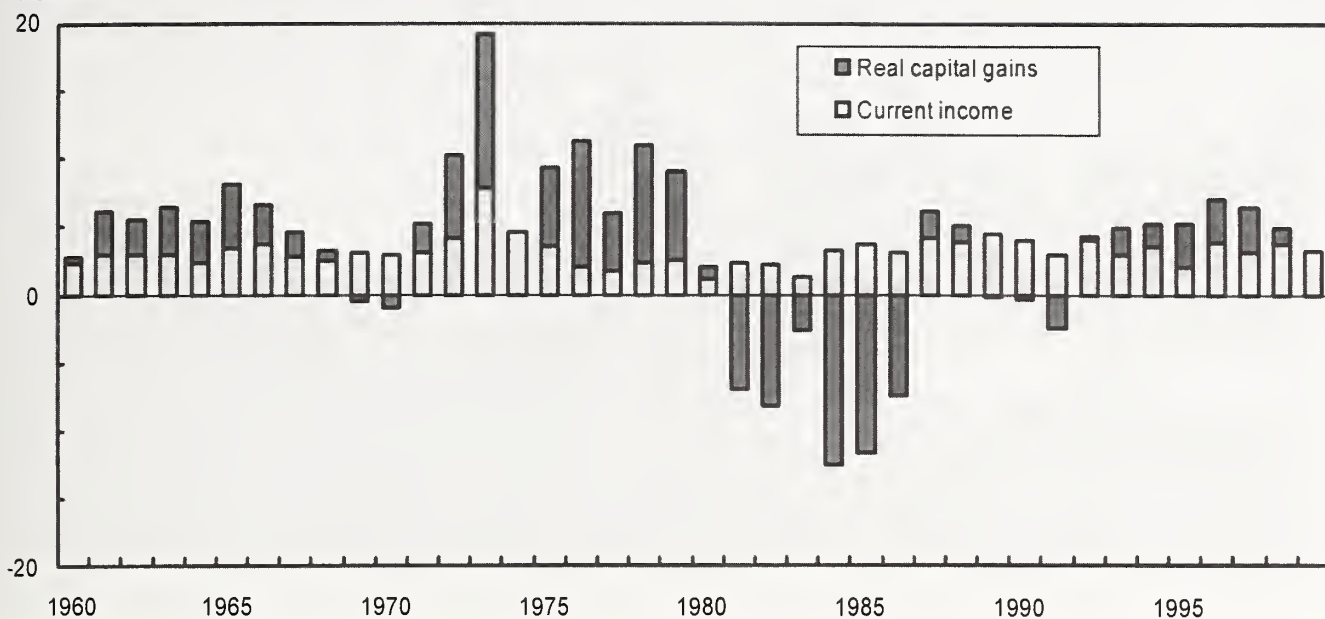


Figure 4
Real trade weighted value of the U.S. Dollar, 1973-1998
 Dollars

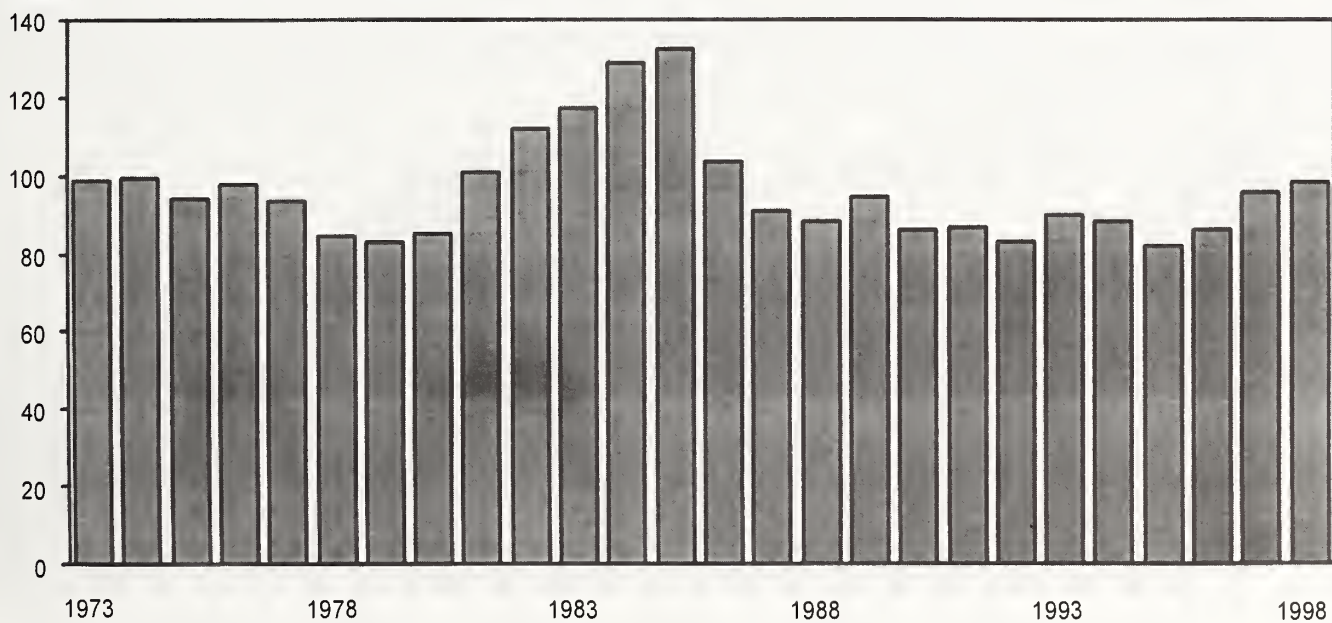


Figure 5

Real agricultural exports, 1960-1999

\$ billion

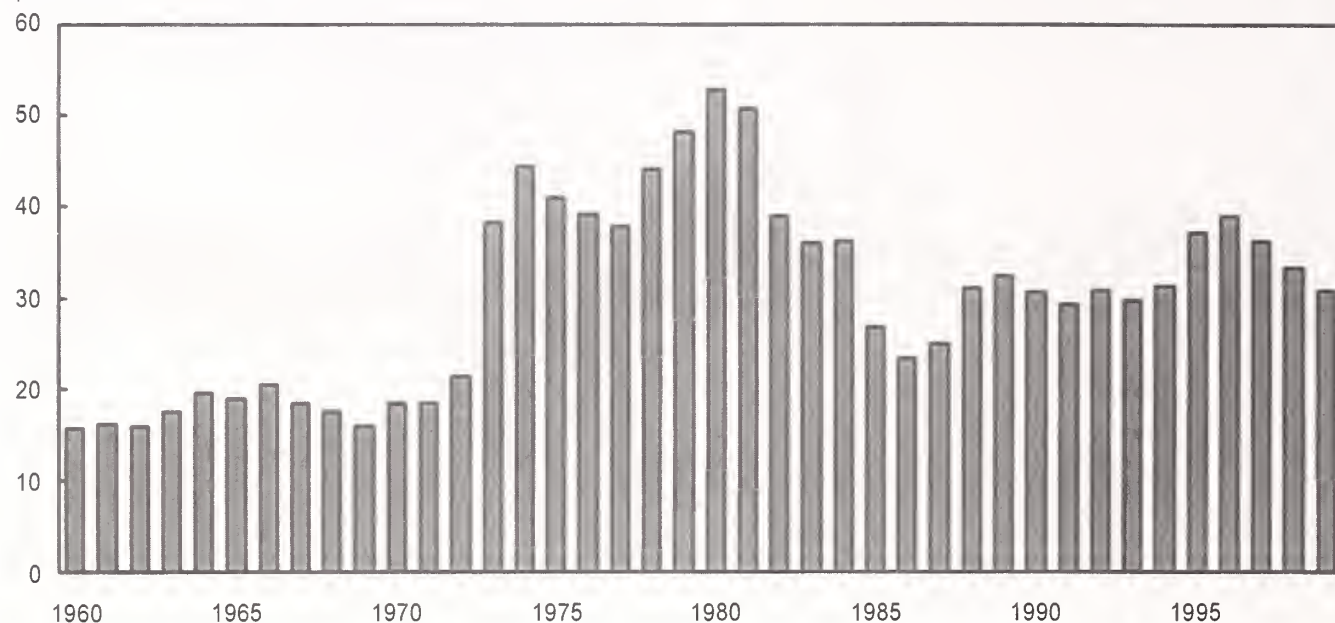


Figure 6

Nominal and Real Farm Debt, 1960-1998

\$ billion

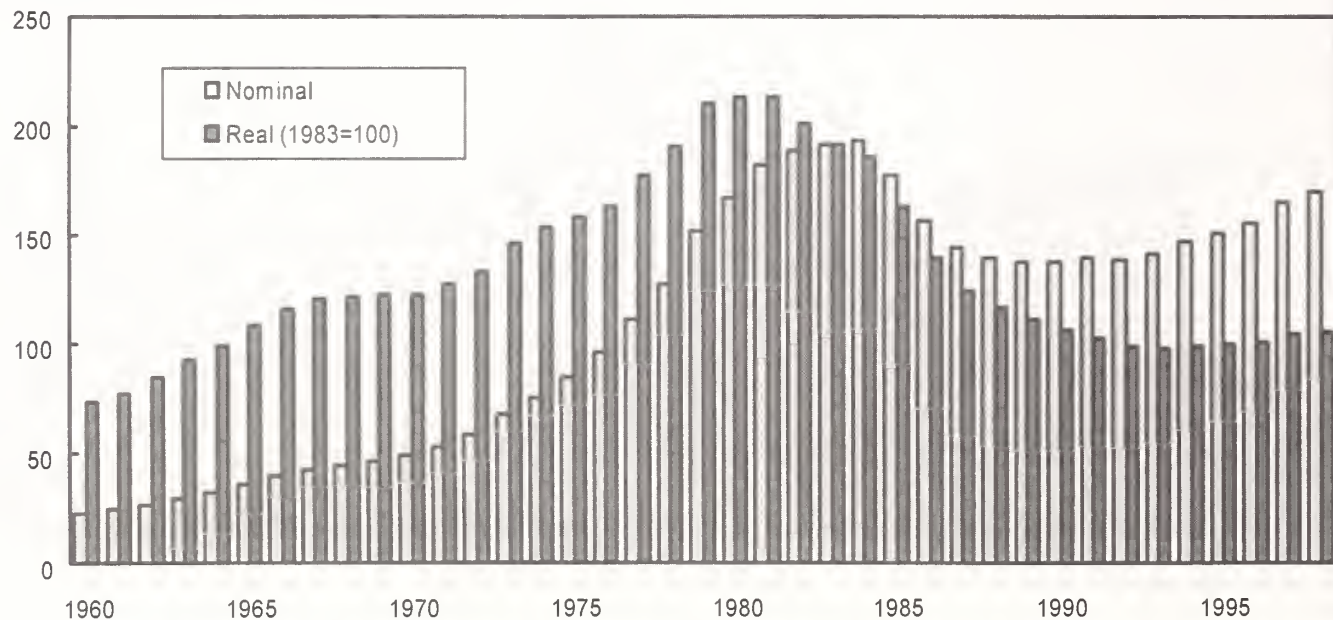


Figure 7

Real average agricultural interest rates, 1960-1997

\$ billion

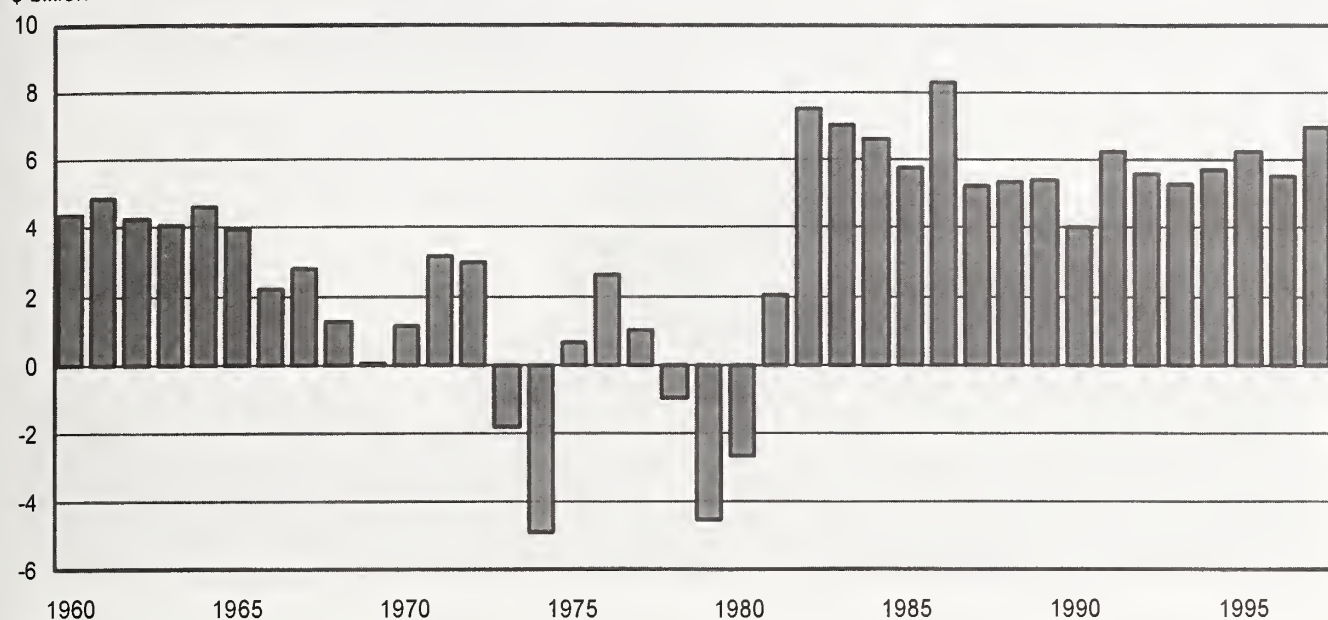


Figure 8

Real and nominal farmland values, 1960-1998

\$ billion

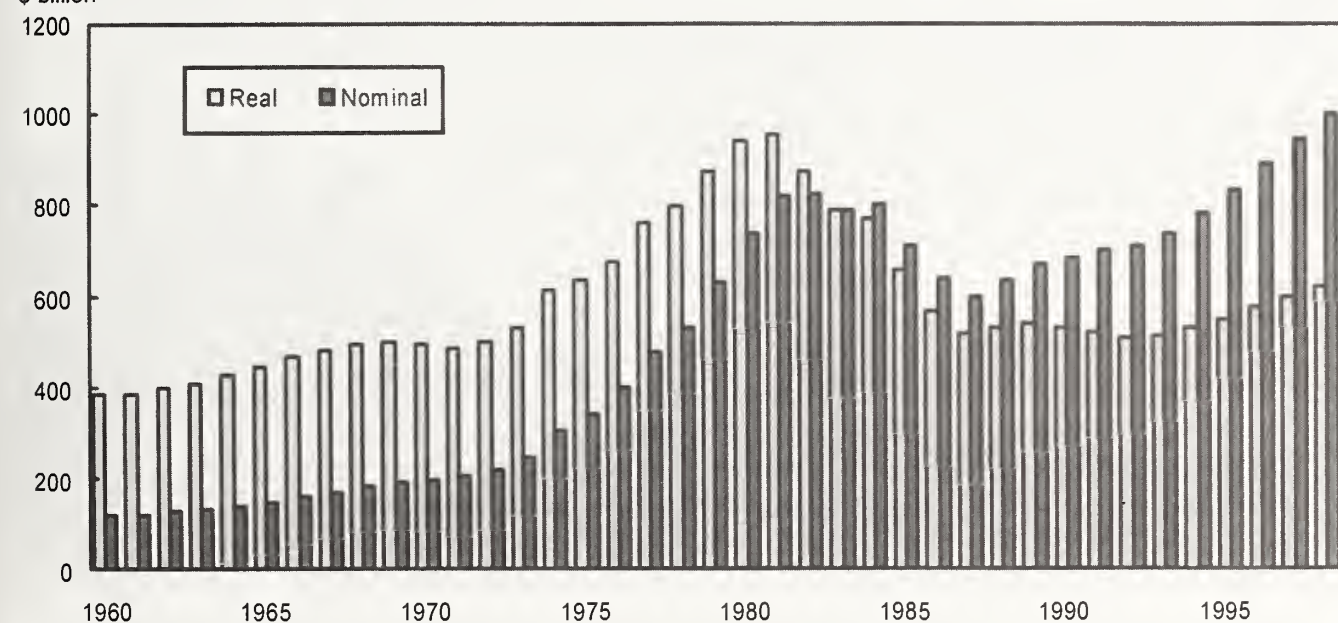


Figure 9

Real Gross Investment in Farm Machinery and Equipment, 1983=100

\$ billion

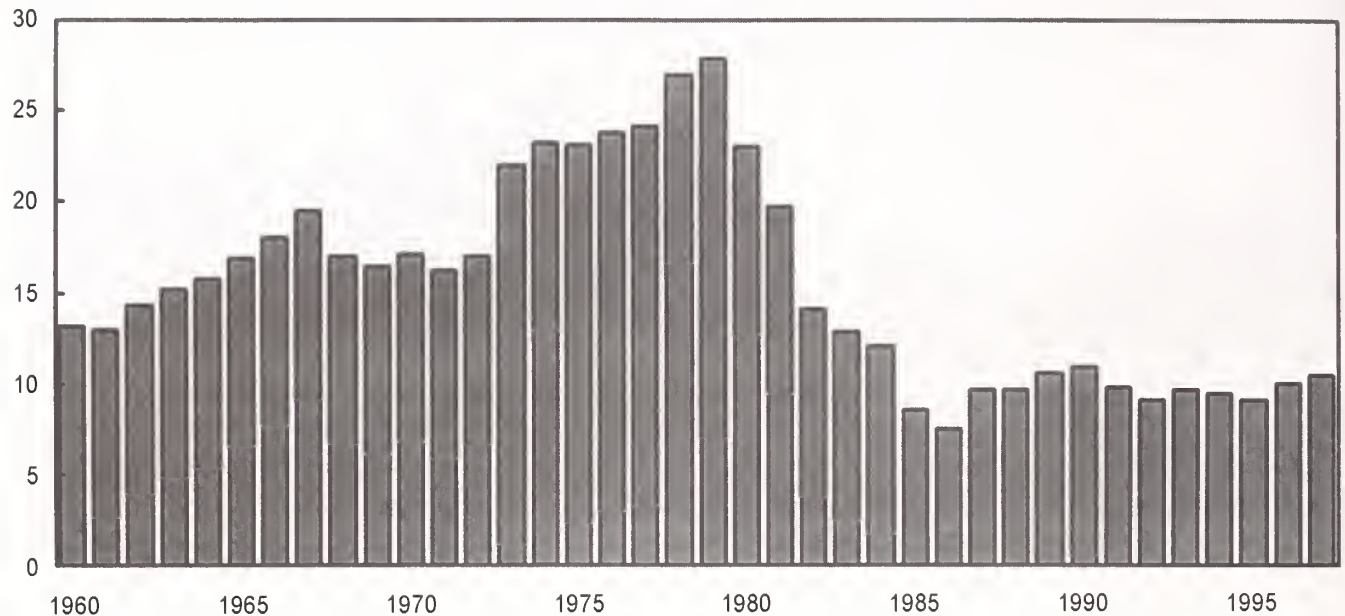
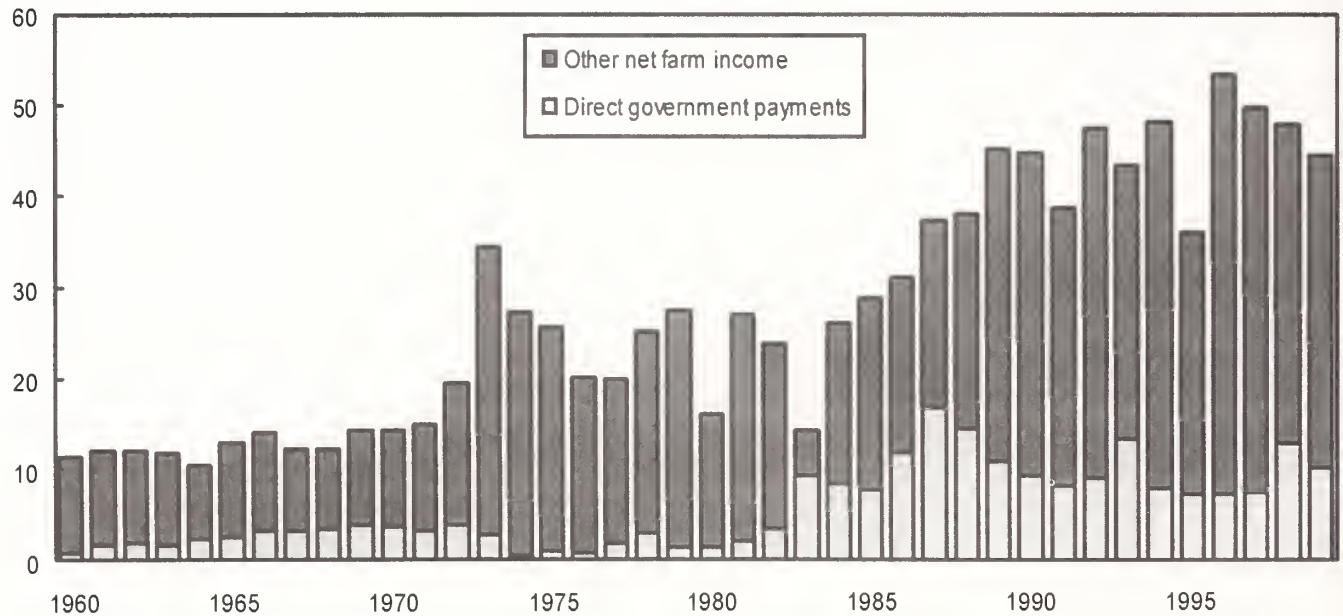


Figure 10

Nominal net farm income and direct government payments

\$ billion



MARKET PERFORMANCE AND PRICE DISCOVERY ISSUES IN AN INDUSTRIALIZED AGRICULTURE

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The U.S. agricultural industry is in the midst of major structural change—changes in product characteristics, in worldwide production and consumption, in technology, in size of operation, in geographic location. And the pace of change is increasing. Production is changing from an industry dominated by family-based, small-scale, relatively independent firms to one of larger firms that are more tightly aligned across the production and distribution chain. The industry is becoming more industrialized, more specialized, more integrated and more managerially intense. Our purpose here is to first describe the industrialization process, to raise critical policy issues concerning the efficiency and effectiveness of agricultural markets, and to suggest some alternative policy responses to this dramatic restructuring of agriculture.

Industrialization of Agriculture

Industrialization of agriculture means the movement to larger scale production units, that use standardized technology/management and are linked to the processor by either formal or informal arrangements. Size and standardization are important characteristics in lowering production costs and in producing products that fit processor specifications and meet consumers' needs for specific product attributes, as well as food safety concerns. Smaller operations not associated with an industrialized system will have increasing difficulty gaining the economies of size and the access to technology required to be competitive, except perhaps in niche markets. Access to input and product markets will be especially critical.

For example, industrialized pork production is now the norm for most expanding firms in the industry. The manufacturing approach to pork production and distribution contributes to quality control as well as cost control. In many cases, this industrialized model of production and distribution will foster much larger scale firms; in 1988, approximately 5 percent of total pork production was concentrated in the hands of the 40 largest firms whereas, the 50 largest firms in 1999 are expected to produce approximately 50 percent of the total U.S. pork output (Freese). Technological advances combined with continued pressures to control assets and improve quality are expected to provide incentives for further industrialization of the industry.

There will be a number of ways in which industrialized food systems are organized and owned. These alternatives will likely include alliances of formerly independent companies, producer-owned cooperatives, and total vertical integration. Consolidation has and will occur in input supply companies (for example Monsanto acquisition Holden Seeds and DeKalb Genetics) and product procurement and processing (for example Cargill's acquisition of Continental Grain).

Systems will be formed by combining input industries, producers, processors, distributors, and even retailers. Firms will likely find it necessary to be part of a food system and to specialize their services and skills in a narrow function.

Industrialized agriculture is characterized by: 1) adoption of manufacturing processes in production as well as processing, 2) a systems or food supply chain approach to production and distribution, 3) negotiated coordination replacing market coordination of the system, 4) a more important role for information, knowledge and other soft assets (in contrast to hard assets of machinery, equipment, facilities) in reducing cost and increasing responsiveness, and 5) increasing consolidation at all levels raising issues of market power and control.

Market Policy Issues

This restructuring of agriculture raises a number of public policy issues relative to the effectiveness and efficiency of agricultural markets; we will only discuss three of them here.

Competitiveness of product and input markets

How will the structural changes that are occurring impact the competitiveness of and strategic positioning in the agricultural product and input markets? The development of tighter linkages and formation of food supply chains may have an impact on market access in both the input and product markets. And the development of larger scale firms could result in sufficient concentration to enable these firms to exercise oligopolistic if not monopoly power in negotiating prices or terms of trade. How will the structural changes in agriculture impact access to product markets? What are the implications for producers, consumers and competitive markets? How will the structural changes impact access to input markets? More specifically is concentration in the poultry, pork and beef industries and their associated product and input markets sufficiently high to warrant antitrust intervention? What are the consequences of such intervention (or of not intervening) in terms of incentives to innovate, efficiency, externalities and distribution of returns and risks?

Some would argue that the basic nature of competition has changed in recent years, and in particular the definition of the market is vastly different today in terms of the product/service domain, the geographic domain and the definition of a firm as an entity. With respect to the product domain, particularly in the service market, the increasing importance of information as a resource and the ability to use the same customer information in a wide array of service industries (for example retailing and financial services) has resulted in the integration of many service industries. World-wide sourcing and selling has changed the geographic boundaries of markets from regional or national to global. And some are suggesting that as more industries develop increasingly more tightly aligned supply or value chains from raw material supplier to end-user, competition in the future will not be between firms but among chains.

Supply chains and market performance

The industrialization of agriculture is likely to significantly impact the effectiveness of markets in providing accurate messages to consumers and suppliers in the food chain concerning

prices, quantities, and qualities of products and attributes. With the formation of more tightly aligned food supply chains, it can be argued that messaging is much more precise, timely, and generally more accurate for participants in the chain than might be provided by market forms of coordination. Critical assumptions of this argument are that product attributes are accurately measurable, and that consumer demand for attributes is predictable. A recent study of this phenomenon in the pork industry provides support for this hypothesis, but much additional work in this and other industries is needed (Cloutier).

What about the risk faced by those who are not part of the tightly aligned supply chain — i.e., are not qualified suppliers? Is there more volatility in the prices they receive because of thin markets? Do they have access to a market or are they closed out because only qualified suppliers can participate? Because of the thinness of these markets, are they not only subject to more volatility, but also to more potential for manipulation? Do the prices and other information conveyed by these thin markets provide accurate messages to consumers and suppliers concerning quantities, qualities, cost, and value? If the commodity markets become the “salvage” market for products that do not meet specifications in the qualified supplier system, do they then become frequently oversupplied with the prospects of more downside price volatility than upside potential? If those who cannot participate in the qualified supplier systems can only sell in commodity markets and these markets take on the characteristics of a salvage market, do the participants incur more of the risk of more tightly aligned chains that are part of the industrialization without the potential of receiving any of the rewards? If markets become sufficiently concentrated that only one or possibly two qualified supplier arrangements are available in a particular locale, how can participants be assured that their share of the risk and rewards of participation are equitable? The fundamental issues of access to information, transaction transparency, equitable sharing of risk and rewards by nonparticipants as well as participants in tightly aligned supply chains, and the risk associated with market access are all important market risk and performance issues that are part of the industrialization of agriculture.

Privatization of intellectual property and innovation

What role does intellectual property right law play in encouraging more tightly aligned supply chains and monopoly or oligopoly power? How does the privatization of research and development and information markets impact the rate of innovation? The distribution of the benefits of innovations? Access to markets? The competitive rivalry in markets? How important are property rights and rent seeking behavior in encouraging firm growth? In encouraging new innovation? In stimulating economic growth?

With the heightened importance of information as a source of strategic competitive advantage, the potential increases for information-based competition between production/marketing systems. Such competition is particularly likely if information within a more tightly aligned supply chain is superior to that of a less tightly aligned, market coordinated production/distribution system. Similarly the opportunity to protect information in the form of genetic manipulation or biotechnology with patent or copyright law offers another platform for information-based competition. In such settings, the issue of market power exploitation within a chain or in competitive positioning relative to other chains is likely to arise.

The role of the public sector in making information a public good that is broadly available to all potential users, and the more general issue of intellectual property rights, become critical with the formation of more tightly aligned supply chains in agriculture. The intellectual property rights debate has historically focused more on research and development and new innovations protectable under patent or copyright law. Particularly in production agriculture, the public sector has played a major role in the research and development activity, and thus provided broad access to new technology and ideas. In this context, part of the public purpose was developing and disseminating new ideas in a broad fashion so that a wide spectrum of users benefitted. This received public support when agricultural production included many millions of small family managed units. What has changed the rationale for public support of agricultural technology? If concentration of input or product sub-sectors of agriculture now allows the recapture of development expenditure and attractive profits that were not possible under the old structure of many truly independent small farm units, does this not now raise new questions about the nature of these markets and public involvement.

As more and more of the research and development effort, and thus new innovations, come from private sector firms rather than the public sector, and as more of the information dissemination system becomes privatized, individual firms have more potential to capture value at the expense of end-users. They have the potential to restrict access to new ideas and information to particular users, thus favoring some producers and excluding others from the ideas, technology or information necessary for them to be competitive. The concepts of intellectual property rights, including patent and copyright law as applied to agriculture, were developed in an era of domestic markets and national firms; a relatively large public sector research, development and information dissemination system; and a limited role of information as a critical resource. These concepts should be reevaluated in the current context of global markets and multi-national business firms; the shrinking role of the public sector in research, development and disseminating information; and the increasing importance of information compared to other resources as a source of strategic competitive advantage.

Regulation of Structure

What is the appropriate public policy response to the profound structural changes in the industry? Regulation of structure and the market consequences of these change in structure is a very contentious public policy issue. The dimensions of this issue are far-reaching and complex, including the implementation of anti-trust policy to an increasingly concentrated and integrated food industry; the regulation of the ownership of farm land, livestock facilities, and other resources used in production agriculture; state and/or federal legislation and regulations on the appropriate form of business organization (corporate farming, contract production, limited partnerships, etc.) and who are appropriate participants in such business arrangements; contract protection provisions which specify the rules and the protections available to various contracting parties; and even local county and township zoning regulations which influence the ability of individual producers to construct new livestock facilities or implement various farming practices.

Concerns about market power and concentration in the agricultural industry might result in increased scrutiny under anti-trust laws and regulations, although the current posture of limited enforcement under these rules makes that unlikely. More likely, state legislators, concerned about

the future of family farmers and threat of corporate farming, may constrain forms of coordination arrangements such as contract farming or integrated ownership of various stages of agricultural production. Note, however, that such limitations are more likely to influence the geographic location of various activities in the food production and distribution chain, rather than the method of coordination, unless such legislation is national in scope. Iowa's prohibitions merely encourage activity elsewhere.

Production sector structure questions

In attempting to regulate the structure of agriculture, particularly as it relates to the production sector, some critical questions should be answered. Some examples are:

1. Are there ways to protect market access for independent producers, other than restricting vertical integration or vertical linkages? One way might be to require processors to purchase some minimum percentage of their daily kill on the cash-spot market.
2. Is the important question whether the alternatives available to a producer are cash-spot markets or contract (or other vertical alliance) alternatives, or is it the number of alternatives available and the market power of each? In other words, is there really any fundamental difference between a producer choosing among two or three packers to sell to, or signing a contract with one of two or three contractors? One obvious difference is that the choice of packers is made every week or two, while the choice of contractors is only made once a year or once every few years, depending on the length of the contract.
3. Is it more desirable for cooperatives to engage in contracting with producers or to vertically integrate than other corporations or large privately held firms? Who should have the potential benefit of market power and monopoly profits. One apparent concern with allowing existing cooperatives to contract or integrate is that they might use equity capital built up from independent producer members' contributions to help other contractee producers start or expand, such that they compete with the independents. Would it be more desirable to encourage new cooperatives to form, which would take advantage of economies of size, but using only contractee capital? If there are efficiency advantages of larger operations, would it be more desirable for groups of farmers to own and operate the operations than others? Do farmers "wear whiter hats" than others, in some sense?
4. Many producers are concerned about risk, and contract production and other strategic alliances are methods to manage risk. What other strategies might producers adopt to manage risk? Marketing contracts, futures and options trading, and contracts that simply guarantee access to a slaughter facility are possibilities.

These are questions that are being asked, and they are important. However, it may be more appropriate to focus now on the broader policy issue of balancing public and private interests under structural change.

Expanding the policy options

Several broad policy options are available to deal with the structural change that is occurring in the agricultural industry. One option would be to do nothing — to let the changes take their course within the state and federal laws already in existence. A second option is, as suggested earlier, to prohibit various types of activity that are deemed socially undesirable. This option precludes institutional innovations that may have significant economic and social costs and benefits in favor of the status quo. Such a policy might not only be difficult to implement, it might eliminate opportunities to develop a more efficient and responsive food production and distribution system.

A third option is to impose new “rules of the game” that would level the “playing field” or maybe even give some participants an advantage; or define the relative “rights” of various parties in contracting, ownership and other negotiated linkages, where the potential for unfair treatment or exploitation is a concern. Prompt payment and custodial account provisions under current legislation for livestock buyers and grain merchandisers are examples. The essence of this policy approach is to develop an institutional structure surrounding vertical supply chains (not unlike the institutional structure surrounding markets) that responds to the public policy concerns. Such a structure might include open access to information on prices and terms of trade of all transactions whether they be within a vertically aligned chain or not. It might include redefining anti-trust legislation to acknowledge concerns about market power related to position in a vertical chain as well as market concentration and size. It might include provisions to minimize opportunistic behavior and exploitation by mandating compensation if, for example, contractual obligations in a vertical chain are not fulfilled. Another policy response would be to alter the power potential in negotiation between producers and others in vertical chains by increasing producer bargaining rights. And new arrangements and institutional structures for more equitable sharing of risk and rewards in vertical alliances as an alternative to fixed price contracts might be mandated or encouraged including various forms of profit and loss sharing arrangements. Providing educational programs, legal advice and mediation or negotiation services to help parties evaluate and resolve contractual or other business linkage conflicts might also be appropriate. The fundamental principle here is to develop a new institutional structure to surround vertical systems of economic activity to eliminate the potential of power or exploitation so as to accomplish the same goal as the current institutional structure is to accomplish in a market environment. Putting such a new institutional structure in place may only occur if those gaining power under structural change see a less attractive alternative likely.

A Final Comment

The structural changes that will impact agriculture over the next decade will be profound. The economic benefits of the dual dimensions of industrialization of agriculture — implementation of a manufacturing approach to the food and industrial product production and distribution chain, and negotiated coordination among the stages in that chain — are expected to dominate the economic and social cost, resulting in a rapid movement of the livestock sectors (particularly pork) followed chronologically by the grain sectors to an industrial model of production and distribution. The implications of this industrialization process for agricultural markets and market policy, and agricultural policy in general, are profound. In essence, the underlying policy

questions can be stated simply: (1) should public policy limit or shape the industrialization of agriculture so that the end result is more compatible with what is perceived by some to be a more acceptable structure of the industry; and (2) if industrialization of the agricultural sector does occur, what are the implications for appropriate public policy concerning market and non-market mechanisms that will be used to coordinate the food production and distribution system.

PRICE DISCOVERY CHALLENGES IN THE LIVESTOCK INDUSTRY

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Background

The title of the session carries with it an implicit question, or perhaps that should be "questions." The rather apparent implicit question is one involving what price discovery will look like in the years beyond 2000. An arguably less apparent implied question, but one on the minds of many astute observers of the livestock industries in this country, is whether there will *be* any significant price discovery function as we have traditionally known it in the years beyond 2000.

Price discovery is the dynamic interaction of buyers and sellers as they seek to find or to "discover" the market-clearing price. By implication, this is a competitive process with well-informed buyers and sellers entering some type of marketplace infrastructure and executing their buy and sell objectives. In the process of that give-and-take with what is admittedly less than perfect information, a market-clearing price is being discovered. This is, of course, the process of interaction and/or negotiation that goes on at the various points of exchange along the continuum between the original livestock producer and the consumer of a finished product. Separate and independently operated profit centers are usually involved at the production, processing, transportation, and retailing levels of economic activity in a price coordinated system featuring several points of exchange.

The vast research and educational literature dealing with the livestock and meats systems in the United States has been predicated on this type of market organization or structure. There is separate ownership at the various levels of economic activity, and while these economic activities are technically related much as are the operating stations along an assembly line, they can be subjected to substantial separation or inconsistency in terms of goals, objectives, and operating norms. The literature has always ascribed to the pricing system the job of coordinating these various levels of economic activity thereby ensuring that what is offered to the final consumers will in fact be consistent with their needs and/or preferences. Price signals, premiums or discounts, are gleaned from the yes-no consumer decisions on a particular product offering by retailers, and those signals are sent back down through the complex chain of events to prompt producers to make any needed changes in the quality of their production.

The path along which those price signals are presumed to travel is, at best, a difficult communication path to follow. There is the expected profit center mentality at each level of activity. Out of profit-maximizing goals and objectives comes an operating philosophy at each

level that may or may not be consistent with what would be needed to accomplish high levels of coordination between what is demanded by consumers and what is offered by producers. A myriad of governmental policies and programs has developed over time to help make this price coordinated system function, succeed, and survive. There are market regulation policies in place, antitrust statutes that presume to influence firm conduct and performance of the system, and widespread programmatic activities to facilitate the workings of the pricing system. Paramount in this latter category of facilitative policies and programs are the government's grades and grading activities, efforts in food safety, and significant programs to collect and disseminate economic planning and/or price and market-related information.

The dual questions of how much price discovery activity will be seen and the form it will take in the years beyond 2000 may well be answered primarily by how effective current and future government programs of a facilitative nature turn out to be. This, it would appear, is the interesting and important policy-related issue as we think about, anticipate, and plan for the new millennium.

Changing Systems of Coordination

The efficacy of a price-coordinated system is going to be challenged in an increasingly complex global marketplace. As production and processing technology becomes yet more sophisticated and as new and sophisticated merchandising programs are attempted, the traditional price-based system will be a focus of attention. Whether it will be able to respond and maintain what remains of its historical position as a coordinating mechanism may well depend on what happens in our policy deliberations and decisions to change programmatic thrusts at the national level. Boehlje, *et al.* talked about 10 major changes they see in a restructuring of food, fiber, and agribusiness industries in the U.S. One of those 10 that they identified was called "integration, coordination, and partnering." The researchers summarized their thinking about the issue of control of the system as follows:

"The fundamental issue of control of the system will result in significant new linkages between food firms, farmer/producers, and input supplier with the full range of acquisitions, joint ventures, and contractual and partnering arrangements being used. In many cases, the primary motivation for this more integrated system is to provide more accurate signals to producers and input suppliers as to what the ultimate end user, the consumer, wants in his food products. Increasingly, the current spot market pricing system is not providing the detailed information consumers want on product attributes such as safety and residue-free products or consistency in quality, and other mechanisms for conveying this information are being used such as contract specifications."
(Boehlje, *et al.* p. 497)

In no sector of food and fiber systems are these issues and these questions of control more apparent than in the livestock industries. Effective price discovery, it could be argued, refers to a well-informed interaction between buyers and sellers with a capacity to attach a price or a price signal to product attributes of importance to the final consumer. If the price signal type of communication system is to work and is to motivate change as needed at the

producer level to keep the basic raw material aligned with the ultimate needs of the consumer, any value differences that would influence consumers yes-no vote on a product offering need to be identified and brought into the pricing process. In other words, if there is a need for quality categories one through five, then those five quality differentials have to be identified so each can have a price discovered for it as compared to an aggregate or averaging-type pricing process where those specific quality levels are not identified.

When Boehlje and his colleagues mentioned that some of the current spot or cash market pricing systems are not providing the detailed information that consumers want on issues such as consistency and quality, they likely had the livestock and meat sectors in mind. The research literature has shown a substantial variation in eating satisfaction within the Choice grade for fresh beef, for example, across the past two decades. In the 1990s, as the national trade organization in the beef industry prompted beef quality audits for both the years 1990 and 1995, it has become apparent that inconsistent quality is a major problem for the beef sector. The professional meat scientists who organized and conducted these audits are indicating that one out of five, possibly one out of four, steaks from the Choice grade for beef is so tough as to block a reasonably satisfactory eating experience. This is a classic case of market failure and has arguably been a major contributor to the problems of declining demand that have plagued the beef industry for two decades. Analysis suggests that the demand for beef has decreased each year since 1979 or 1980 (Purcell, 1998).

Problems of a similar nature have plagued the other livestock-based meat products, specifically pork and lamb. USDA grades that were historically employed in reporting market prices did not distinguish in any significant way for final values of pork carcasses in terms of leanness and/or eating quality. As the large packer/processors started moving toward more of a merchandising mentality in their pork offerings and are into export markets, the lack of effective quality control became a major obstacle. Slaughter hogs, offering different identifiable levels of quality, especially as reflected by leanness of cuts, were not identified separately and priced by the price-based marketplace. To achieve the necessary control over quality and to avoid the merchandising problems associated with a highly variable quality of slaughter hogs coming to the marketplace, the processors have moved to control decisions on genetics, production management, rations, and health programs in their own or contract production arrangements. Once a modicum of control over quality variation was accomplished, the processors started to make important new investments in product and market development and to position themselves to brand and stand behind the quality of fresh pork offerings.

These systems in pork replace rather than complement the price-driven systems. They are an explicit recognition that the pricing system has failed and that the marketplace featuring separate profit centers at the various levels of economic activity with price to accomplish the needed level of coordination has not worked. As we move into the new millennium, we face the likely possibility that a majority of the pork produced in the United States will be produced under systems where there is an important element of control that is not price based. Whether they are vertically integrated systems where ownership of two or more stages of economic activity is involved or whether the coordination is accomplished by contract specification,

these are non-price means of effecting the coordination that the processors appear to be saying they must have to accomplish their objectives.

In the beef system, the highly controversial captive supplies have been a response to the problems of variability in both quantity flows and quality of cattle. Where contracts are involved to schedule cattle through the plant, the processors can manage the stability of their operating levels and try to keep costs down. Increasingly, price grids or some set of premiums and discounts are being paid vis-à-vis some base price that is provided for in the contract. Unfortunately, the pricing grid or set of premiums and discounts being employed varies across every buyer and even within a particular buyer's program depending on projected end use for the particular set of cattle. This complicates any improvement in the level of coordination that a pricing system is able to achieve. Even when a premium or discount schedule is employed, it typically is no more refined than dividing the Choice grade into high Choice and low Choice, and the widely documented variation in eating quality within the Choice grade is still not managed effectively.

The vertical alliances that are emerging in the beef sector are another obvious attempt to get away from the problems of uncertainty that plague the price-coordinated system. For decades, beef producers who are making the breeding decisions at the farm level and choosing the genetics that will determine the nature of the beef product have agreed that there is little or no price discrimination and little or no pricing to value. There is a tendency to price on averages throughout the system from the sale of the small, weaned steer calf to the 1,200-lb slaughter steer and heifer coming out of feedyards. Indeed, in recent years that problem has arguably worsened as there is often a time window of only one to two hours during the week in which many of the cattle that are sold for that week are sold at essentially one average price. This is not effective price discovery and is not the necessary condition for an effective price-based system of coordination.

In an alliance, the producer can receive a calculated imputed value based on contribution of calves to the ultimate success of the coordinated program. No visible pricing takes place, and there is no contribution to price discovery for the beef industry in its entirety. The alliances are, it would appear, a predictable reaction to a failed pricing system that has not been able to discover prices consistent with value, a system that has been relegated to a system characterized by aggregating across value differences and trading cattle at virtually every level on price averages. There is obviously no effective communication and no high level of pricing efficiency in a system where attributes of significant importance to the final consumer of the product are not identified and are not brought into the pricing process.

The lamb industry in the United States has experienced demand decreases that may well parallel those that can be documented for beef. The pricing system for live slaughter lambs has not only been ineffective and inefficient but has arguably been based on perverse incentives. Within acceptable weight ranges, packers have always paid higher prices for lambs with higher dressing percentages. Yet, there is a widely researched and widely established negative correlation between dressing percentage and yield grade or the measure of lean cuts as a percentage of total carcass weight. Not only was leanness, which is clearly an attribute

consumers wanted to see, not being encouraged, it was actually being discouraged by the way the slaughter lambs were priced and valued. This is not, of course, an effective system that will ensure that the needs and preferences of consumers are met by what producers offer over time.

A Public Good Component

The industrialization of agriculture is increasingly widely discussed. There have been congressional attempts to regulate the marketplace as buying processors in livestock get larger relative to selling producers. Proposed legislation has ranged from dictating how buyers and sellers should transact their business to restricting the percentage of slaughter livestock that could be "captured" by any particular buyer in any particular market area. Behind these well-meaning attempts is typically an interest in maintaining the type of structure that we have historically seen in rural America. Careful perusal of a number of USDA policies ranging from payment limitations in the old farm bill programs to programs encouraging economic development, economic viability, and quality of life in rural communities suggests a bias toward an atomistic sector with independent family farms. Typically, the view of that rural community that is explicitly or implicitly called for in some of these policy measures is one where independent, often family-based, farms are functioning as entrepreneurs and providing the bulk of the important raw material as it moves into processing in our food and fiber systems. If there is to be something approaching an atomistic structure at the producer level, such that independent operating farmers and farm families can function in an entrepreneurial way and make the necessary contributions to a coordinated production and processing system, then the price discovery system must be effective. The price signals have to be transmitted, and the price incentives that show up at the producer level must be recognizable, must be attached to product attributes that the producer's decision could influence, and they must be consistent with what the consumer wants and is willing to pay for.

Those conditions will not typically be met by for-profit firms pursuing a profit-maximizing scheme at the various levels of the system. If there is a "public good" component to all this, it occurs when the public at large desires a particular end result and recognizes that the desired end result will only occur if the public is somehow involved. We would never have had, for example, a standardized set of grades for feeder cattle or for slaughter cattle unless the public in the form of the USDA, a number of decades back, got involved and launched a grading system. Paid for by the packers but still a voluntary system, quality grades for beef cattle have been around for many years, and yield grades identifying yield of lean cuts have been with us for some 30 years or more. The last major change in the quality grades for beef goes all the way back to the 1970s when the marbling requirement to reach the Choice grade was substituted for, at least partly, by the youth of the animal. The traditionally required increasing marbling as the animal aged within A maturity was eliminated. Across the years there has been a growing, and now widespread, recognition that grades need to be modified and refined, at least to the point of bringing in a measure of tenderness, but no change has been forthcoming. The Agricultural Marketing Service of the USDA provides this public service and contributes to this widely recognized public good, but it tends to be totally reactive in terms of grading specifications and any change in the system.

The grading service is seen by the USDA as a voluntary service, one which performs functions of importance and is needed by the industry. Administrators expect to consider grading changes only when a strong request from the industry is forthcoming and preferably when there is a consensus across the industry and various industry participants with regard to the needed grading change. But this is a standard that is very difficult to meet. In the current system, all those cattle feeders who are feeding cattle of below average quality and selling them at essentially one average price are being paid too much for their cattle, often considerably too much. Conversely, those cattle feeders who are producing above-average cattle are being paid too little. Since the feedyard reflects the primary buyer of and demand for calves and feeder cattle, these same somewhat convoluted signals are passed down to producers. There is no effective price communication, and some experts would argue that quality variation in fresh beef offerings is worse in 1999 than it was 20 or even 30 years ago. Consumers who loudly proclaim they want a high-quality product, want consistency in the quality of that product and in their eating experience, and want convenience in preparation have largely been ignored. Consequently, they have moved to other meats and other sources of proteins across the years as the product failure experiences in the fresh beef market have mounted and taken a major toll.

A Look Ahead

As we approach the new millennium, the economic opportunities associated with a consumer-driven product offering are too big to be ignored. The three giant-sized packing firms in beef are all moving into value-added further processing--moves producers have hoped for since the 1970s. Large pork processors have already made moves toward coordination and control, and some of these firms are moving into pork from a background in poultry. The orientation toward new product development and quality control is what beef, pork, and lamb need, but these moves will prompt the continued demise of price-based systems. Integration and contractual arrangements will often replace price as the coordinating mechanism, testimony to the inability of the price systems to prompt the needed quality control and needed changes in what is being produced at the farm level.

Trying to anticipate the nature of price discovery for livestock beyond 2000 is not a very fruitful exercise. There *will* be price-driven systems, but they will be smaller than today and trending to even lower levels of importance. This will happen because non-price means of control and coordination will appear both more effective and easier to adapt and use.

It is much more interesting to reflect on what policy postures we will develop and, related, the extent to which the public good dimension of price discovery is recognized. Two directions are possible. First, policies and programs to facilitate effective price discovery can be developed and pursued, but this will not happen unless there is a rapid move toward recognition of the public good component of price discovery. The "market failures" in the livestock marketplace destroy the ability of independent farmers to compete. A failure to discover price consistent with final use value pushes the livestock sectors toward integration, contracting, and other means of non-price coordination. Alliances will grow to a position of

importance, especially in beef, as producers and processors look for control and the opportunity to serve an identified consumer market. This trend is in place, is powerful, and will not be denied unless there is a significant shift in public support of facilitative programs in areas like market news. In addition, the willingness of governmental agencies to get out front and be proactive in areas like grades and grading will be very important. Needed changes will not be prompted quickly by an industry pursuing profit objectives that pull in different directions.

The second alternative is to let the private initiatives run their course with little or no policy-based effort to direct them. Price discovery as we have known it will disappear quickly if this course is pursued or allowed. It will linger in beef where integration and contracting is logistically more difficult but will move forward quickly in pork. And where it persists, price discovery will take a different form. Large packers will get involved, perhaps, in "discovery" of a base price for contracts and then apply a "price grid" of premiums and discounts. The same base price might be extended to all sellers, with some pricing to value being accomplished via the grids. This is not the traditional price discovery, but whatever form it takes in an industrialized livestock sector, it will be in the presence of other and non-priced means of coordination.

There is still time for some public choice, some control, over the direction the livestock sectors take. A healthy research-based dialogue is needed if the choice of directions is not to be made by neglect and default.

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PRICE DISCOVERY CHALLENGES IN THE GRAIN INDUSTRY

PRICE DISCOVERY 2000 AND BEYOND

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Abstract

Traditional commodity markets no longer transfer enough information between the producer, processor, and end-user to ensure that grain and oilseed content is aligned with end-use applications. Unless all mutually advantageous bargains are transacted, markets fail. Our present market coordinated structure needs to respond to a shift from trading containers to trading content.

Organizational structures emerge in response to economic opportunity. The world has changed with an explosion of such information technologies as genomics, bioinformatics, precision measurement and the Internet. Price discovery and risk transfer, the foundation of market exchange, are being replaced by value discovery, and information transfer.

The creation of new relationship based organizations along with inputs from biotechnology and information technologies results in a dynamic, responsive and balanced agricultural system capable of meeting consumer food demands for the 21st century.

Shape clay into a vessel

It is the space within that makes it useful. Lao-tzu 400 B.C.

The ancient Chinese philosopher Lao-tzu recognized the usefulness of the space within a container. The container's content contributes to its usefulness. A soybean seed is a container. Value lies within the seed, a unique combination of protein and oil and amino and fatty acids. Soy protein contains, for example, varying quantities of isoflavones that decrease cholesterol and reduce certain cancers. Soy oil consists of several fatty acids appropriate for human and industrial use. Low linolenic oils are healthy for humans. High linolenic oils are best utilized as industrial solvents.

Traditional commodity markets no longer transfer enough information between the producer, processor and end-user to ensure that grain and oilseed content is matched to end-use applications. Unless all mutually advantageous bargains are transacted, markets fail (Hayek 1945). Our present market coordinated structure needs to respond to the shift from trading containers to trading content.

Traditional Market Coordination

Regulated commodity exchanges are like hub and spoke networks. The hub represents a closed circle of member owners. Membership entails access rights to the trading floor where trades take place in open outcry. Physical presence is necessary to capture full advantage of exclusive information flow resulting from buy and sell orders entering the trading pit. The spokes represent registered firms, which are either exchange members or firms associated with exchange members for purposes of access. Non members are prohibited from floor access but do have order access for placing buy/sell orders with members. The rim surrounding the spokes represents the introducing brokers and associated persons registered to solicit orders from the public. The exchange's hub and spoke network collects price information, aggregates it on the trading floor, and distributes the results in the form of a single price.

Traditional commodity markets trade a homogenous product that meets standardized minimum quality factors for delivery to a specific location on a specific date. Financial exchange is facilitated through a clearing organization, which acts as a buyer for every seller and a seller to every buyer. Buyers and sellers transfer price risk through anonymous exchange. This structure encourages trading between anonymous buyers and sellers, thereby reducing search and discovery costs for all participants. The clearing organization guarantees financial performance which eliminates the need for personal contact. The result is an efficient and economical mechanism for commodity allocation.

Producers operate in a near perfect competitive market characterized by many buyers and sellers, a homogenous product, equal access to production technologies, and ease of entry/exit. Minimal returns are the result of perfect competition (Saxowsky and Duncan 1998). Producers are unable to differentiate their commodity production, which leaves cost reduction as the primary strategy for enhancing profitability. Successful producers reinvest gains in additional land which escalate expenses and further drives the need to expand their land base. Absent government support, efficient producers expand commodity production and inefficient producers are unable to compete.

Producers face three alternatives in order to avoid the lack of profitability associated with perfect competition: expand farm size, as mentioned above; form horizontal alliances with other producers; and/or enter vertical alliances with commercial food, marketing, and processing companies.

Commodity markets are one of many alternative coordination mechanisms. Peterson and Wysocki (1997) and Mahoney (1992) describe a coordination continuum ranging from spot markets at one extreme to vertical integration at the other (Figure #1). Spot markets achieve efficiency through arbitrage. Homogenous, substitutable commodities are allocated spatially and temporally based only on price. Relationship and trust are secondary. Information feedback is restricted to price premiums or discounts based on standardized quality terms. Spot markets trade containers.

Vertical integration is on the opposite end of the coordination continuum. Vertical integration substitutes the use of external contracts or price with internal information transfer. Vertical

markets achieve efficiency through lower transaction costs including negotiation and enforcement, price advantage, and improved information flows. (Mahoney 1992) Vertically integrated firms involved in production, processing and distribution capture the full benefit of improved seed content.

Legal contracts, mutual agreements and cooperation fall at the mid-point of the coordination continuum between spot markets and vertical integration. All three structures require a personal relationship. A buyer must know the seller and the producer must know the consumer if they are to negotiate an agreement. Unlike spot markets, which rely on anonymity, relationship based structures require personal interaction, open information flow, and mutual understanding of each other's requirements. These personal alliances are plausible agricultural organizations for the future.

Market Coordination in Agriculture - Alliances for the Future

Relationship based structures, such as production alliances, increase coordination efficiency by reducing the number of sellers. For example, How does a tofu manufacturer in Japan interested in purchasing a specific soybean variety locate a producer in Illinois? How does a producer determine optimum genetics in order to provide the best quality soybean for the tofu manufacturer? What is the best logistic method for shipping a plant to Japan? Producers need to consider organizing alliances in order to pool financial resources, employ marketing expertise, and utilize production capacity to meet end-user volume requirements.

Some producers and corporations are responding quickly to new opportunities emerging in the food industry by forming alliances. Alliances are formal or informal groups of individuals or firms organized around a common purpose for sharing information, transferring knowledge, and targeting resources for member benefit. Alliances effectively reduce the number of individual buyers and sellers in the marketplace, which makes it easier to align and coordinate the food system. The following organizations are examples of such alliances.

The Soybean Producer's Information Guild¹ is a pilot project jointly funded by the Illinois and Iowa Soybean Operating Boards. The project seeks to identify both market opportunities and barriers present in the current soybean industry. The Guild is comprised of soybean producers and focuses on developing relationships between members and end-users.

Guild representatives market member's assets for the benefit of the membership. Differentiated commodities create new opportunities for those who seek to capitalize on its unrealized value. For example, biotechnology unlocks embedded information in raw commodities that differentiates previously indistinguishable commodities. Producers interested in capitalizing upon the profitability in differentiated markets need to organize and develop a market that defines differentiated value. But most individual producers do not have the time, resources, or contacts to develop differentiated market opportunities. The Guild project organizes interested producers into a formal structure designed to identify end-users, market the groups capabilities and

¹ Related information available at <http://www.agribiz.com/IQS>

capacities, collect and aggregate information, and access experts for economic, agronomic and marketing analysis.

The Kearney Area Ag Producers Alliance (KAAPA) is a farmer-direct source for premium, value enhanced grains. KAAPA farmer members form a producer cooperative to efficiently market capabilities for specific end-user clients. Their goal is to establish a labeled or branded product known for its quality and specific traits. The alliance provides members with research services such as variety evaluation plots and bin sampling for attribute analysis. KAAPA is committed to developing a system that provides long-term profitability and decreases annual risk for its producer members and clients.

Optimum Quality Grains,² L.L.C is a corporate sector marketing alliance. Optimum, a joint venture of the Dupont Company and Pioneer Hi-Bred International, Inc., leads the way in providing technology and building partnerships for the value-enhanced grain system of the future. Their vision for agriculture is not to produce more grain, but to produce grain with more value. This subtle but crucial difference reflects the shift from mass production to an end-user value focus.

Consolidated Grain and Barge Company³ (CGB) is a corporate effort interested in building alliances. CGB, operating 60 plus grain elevators located on the Mississippi, Illinois and Ohio Rivers, purchases grain directly from thousands of producers. CGB's Premium Grains program is based on building and improving relationships with growers and end-users of value enhanced grains. Their focus is based on the belief that success enables both spectrums of the food chain, producer and end-user, to succeed.

E-MARKETS⁴ and Precision Foods, Inc. focus attention on information technologies that build marketing alliances. E-MARKETS is an information technology based company that directs creation of virtual coordination tools linking end-users, seed and life science companies, processors, grain warehouses, and producers. Virtual contracting tools, such as the OSCAR Contracting System,⁵ enable users to search for contracting opportunities, provide transparency for available acreage and premiums offered by participating elevators, and enter directly into production contracts.

Precision Foods' Inc.'s INTEGROTM Analytical System⁶ provides the seed, grain and feed industry with real time information needed to convert commodity grain into nutritional products. Near Infrared Spectroscopy delivers precise, accurate, constituent values for seed, grain and feed ingredients. Calculating actual values, rather than book values, gives feed formulators the opportunity to increase the nutritional value contained in feed grain. Ration formulation adjustments use actual constituent values to reduce feed cost, increase animal performance, and enhance grain value.

² <http://www.oqg.com/>

³ <http://www.oqg.com/>

⁴ <http://www.e-markets.com/>

⁵ <http://oscar.e-markets.com/>

⁶ <http://www.integrosystem.com/>

Capturing Embedded Value in the Food System

The traditional market coordinated system provides price discovery for commodity grains and oilseeds. Price reflects container value based on standardized grades, which serve as proxy for quality. Federal grain standards reflect end-use requirements, but fail to recognize information embedded in the grain. Grain standards measure the container but not the content. But price is not synonymous with value. Price reflects cost while value represents return. Value exists at three levels: value embedded in seed content, value embedded in attribute consistency, and value embedded in information flows.

There are two strategies to extract value embedded in seed content: alter the seed content through biotechnology, and/or segregate commodity grain based on compositional value. Biotechnology rapidly transforms agriculture from trading undifferentiated commodities to trading commodities based on consumer valued attributes such as extractable starch or metabolizable energy. Plant biotechnology selects certain plant traits in order to develop new plant varieties. Gene stacking is the insertion of more than one agronomic or quality genetic trait to an organism (Coon, 1998). These traits are accorded value which include enhanced nutritional, environmental, quality, and metabolic modifiers (Reasons, 1999).

Segregating commodity grain based on composition increases end-user value. Commodities possess significant attribute variability (figure #3). Animals consume corn for energy. Feed formulators assume all corn has the same calorie content. What happens when actual corn energy levels vary from the formulation level? What is the cost of wasted energy? The value of consistently higher quality corn to a wet miller is approximately \$0.15 - \$0.20 per bushel, due to increased process efficiency and better capital utilization. Processors may ultimately purchase attribute specific corn to protect themselves from the diversity of corn in the market channel (Eckhoff, 1995). Attribute specific production is the selection of varieties based on compositional factors designed to enhance, eliminate or expand specific traits beneficial to an end-user. Another opportunity associated with grain segregation is expressed in the attached graph (figures #4 and #5). Variability is present in this small sampling of commonly produced soybean varieties.⁷ How does our present marketplace distinguish between healthy and unhealthy oils within the traditional commodity flows? Our present market coordinated system ignores content variability. Potential end-use value goes unrecognized. Producers select varieties without regard to value since no feedback exists in a market coordinated system other than price.

Attribute consistency results when variety selection at the producer level is harmonized with processor or end-user requirements. Consistency can also result from improved attribute segregation at the grain warehousing level. Grain warehouses can precisely measure grain at the dump pit, allowing operators to direct grain flow based on differentiated composition. Feedmills utilize precision measurement that match formulation with actual attribute levels rather than relying on book estimates. Consistent feed formulation results in consistent feed conversion, which produces enhanced quality for the consumer.

⁷ The Illinois and Iowa Soybean Boards provided project funding to measure several hundred, soybean varieties planted on test plots operated by the University of Illinois Department of Crop Sciences (<http://w3.aces.uiuc.edu/CropSci/>). Illinois Crop Improvement provided NIR analysis.

In order to capture added value from specific traits, value has to be measured. What is measured is rewarded. The traditional commodity market depends on the 1916 United States Grain Standards Act for communicating end-use product quality. Grade standards for corn include minimum test weight per bushel, heat-damaged and total damaged kernels, and broken corn and foreign materials. These physical factors serve as proxy for content quality. But grain quality determination today utilizes sophisticated technologies such as Near Infrared Spectroscopy capable of measuring compositional content including amino acid percentages, fatty acid composition, storage proteins, extractable starch, and metabolizable energy. Animals consume corn for energy and soybeans for amino acid. Value is therefore based on energy content, not broken kernels or test weight.

Attribute specific production provides processor, feeder, and food manufacturer with customized inputs matched to specific product traits and quality. Attribute variability across seed genetics is significant as evidenced in Figures #3, 4 and 5. Aligning input specifications with desired output, results in the potential for new product development, differentiation, and ultimately increased consumer value. Increased consumer value can then flow back through the food system, providing incentives at all levels to further refine and improve the process.

The third source of value is embedded in information flows. OSCAR, a virtual contracting tool utilized by OPTIMUM Quality Grains LLC, capitalizes on embedded information flows resulting from the contracting relationship. When a producer contracts for attribute specific production through OSCAR, an agreement is created for the producer, the participating grain warehouse, and OPTIMUM. Notification is forwarded electronically to the producer's local seed and crop protection salesperson. One transaction serves as a catalyst for multiple information transfers. Future applications might include transaction-generated linkages, which trigger financing activities, transportation requests, risk management orders, or targeted sales promotions.

Producers employing virtual contracting services might appear on preferred customer databases that provide interested end-users quick access to experienced growers. Information embedded in transactions can lower search and discovery costs, improve planning and forecasting, lower transportation costs, and reduce inventory requirements.

Conclusions

Different organizational structures emerge in response to economic changes. For example, the poultry and pork industries migrated towards vertical integration in response to consumer demands for safe, consistent, and low cost products. Vertical relationships convey consumer preferences across the entire food chain. Row crop agriculture will gravitate towards vertical forms of control unless producers are able to integrate new technologies and form new relationships.

The world has changed with the explosion of such information technologies as genomics, bioinformatics, precision measurement, and the Internet. Price discovery and risk transfer, the foundation of market exchange, are being replaced by value discovery and information transfer.

The creation of new relationship based organizations such as horizontal alliances combined with investments in biotechnology and information technology results in a dynamic, responsive and balanced agricultural system capable of meeting consumer food demands for the 21st century.

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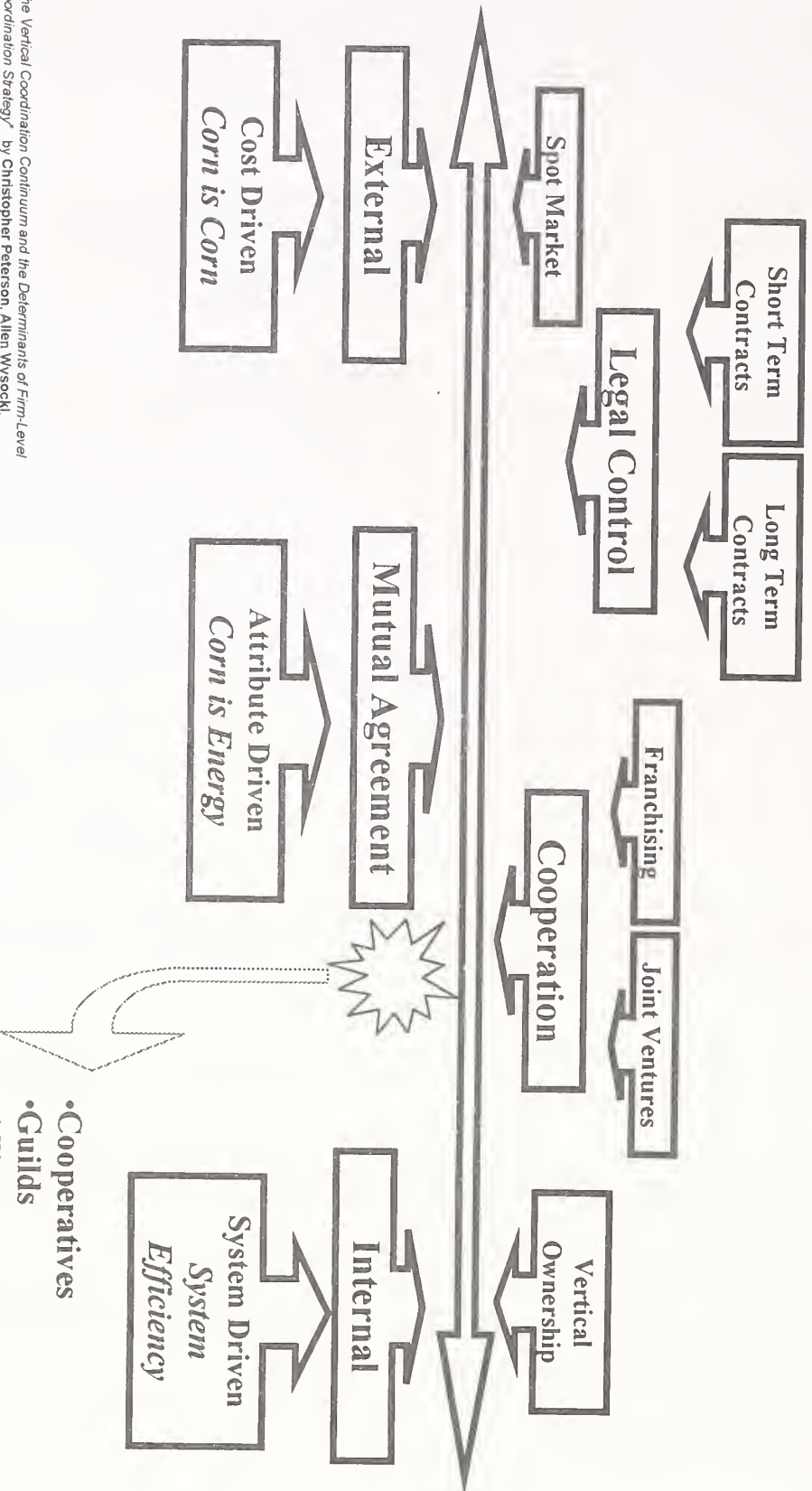
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Figure #1

Coordination Alternatives



• The Vertical Coordination Continuum and the Determinants of Firm-Level Coordination Strategy' by Christopher Peterson, Allen Wysocki, Michigan State University 97-64
 • The Choice of Organizational Form: Vertical Financial Ownership Versus Other Methods of Vertical Ownership' By Joseph T. Mahoney, Strategic Management Journal, Vol. 13, 559-584 1992

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Figure # 2

Attribute Specific Hybrids

Reduce Substitutability
Iowa Grain Quality Initiative
Quality factors Important to corn end uses

Factor	Average Iowa Value Long-term	Importance ^a by End-Use			
		Feed	Wet Milling	Dry Milling	Alkaline Cook
Protein (%)	8.0	++	--	+	+
Oil (%)	3.6	++	++	--	-
Starch (%)	60.0	x	+ ^b	x	x
Density (g/cc)	1.260	+	--	++	+
Test Weight (lbs /bu)	56	+	+ ^c	++	+
Thins (%)	40	x	x	++	x
Thousand Grain Weight (g)	350	x	x	+	x

Basis 15% moisture

- ^a + = important to be higher; ++ = very important to be higher; - = important to be lower; -- = very important to be lower; x = not a major consideration
^b If extractable. Harder corn may have high starch, but may be relatively unextractable.
^c Up to 55-57 lb/bu. Very high test weight is indicative of hard corn, which is difficult to wet mill.

Figure # 3

Energy Variability in Commodity Grain

Midwest 97 study

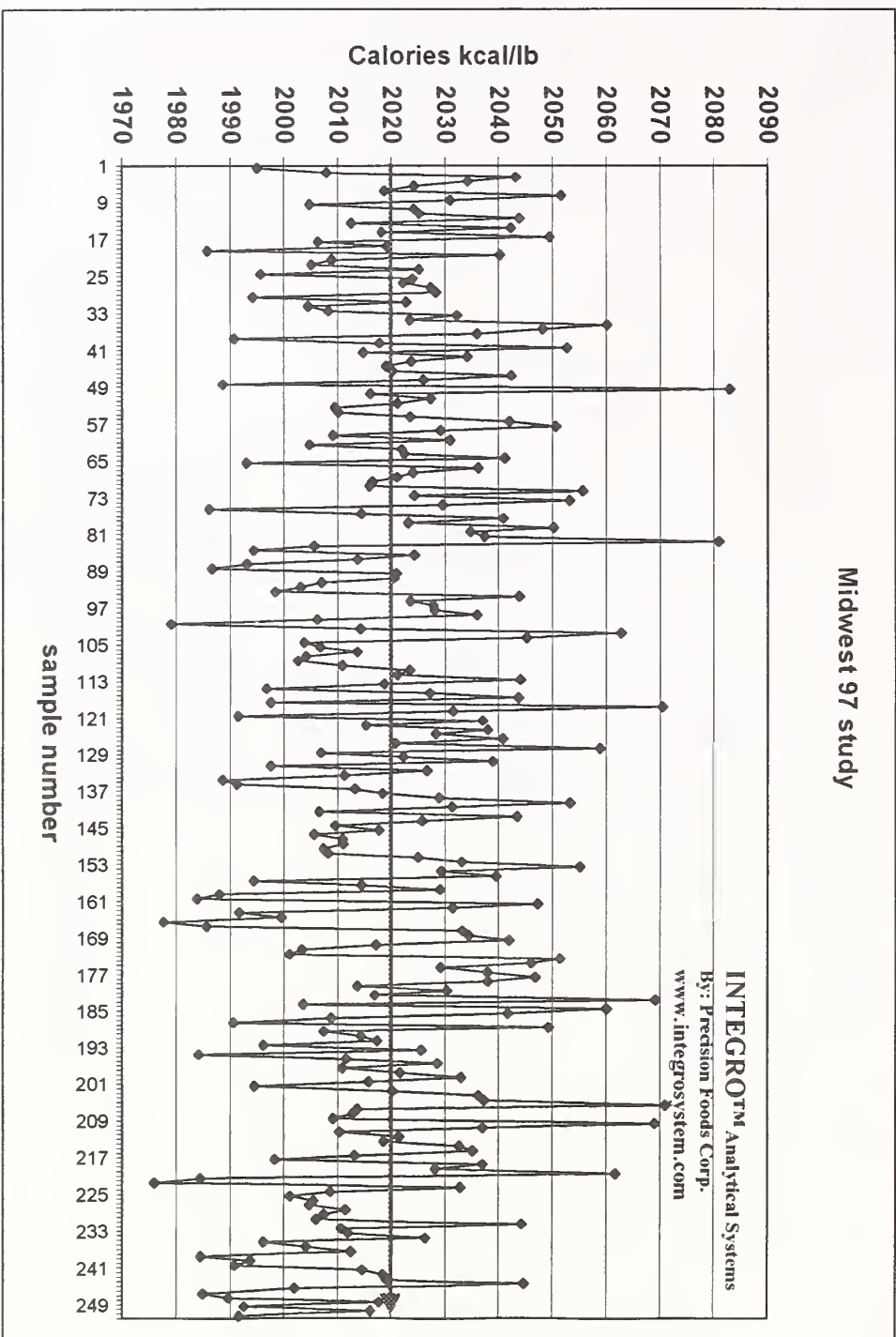


Figure # 4

Soy Oil - Palmitic / Stearic Acid

Off the Shelf Choice - Where is the feedback system?

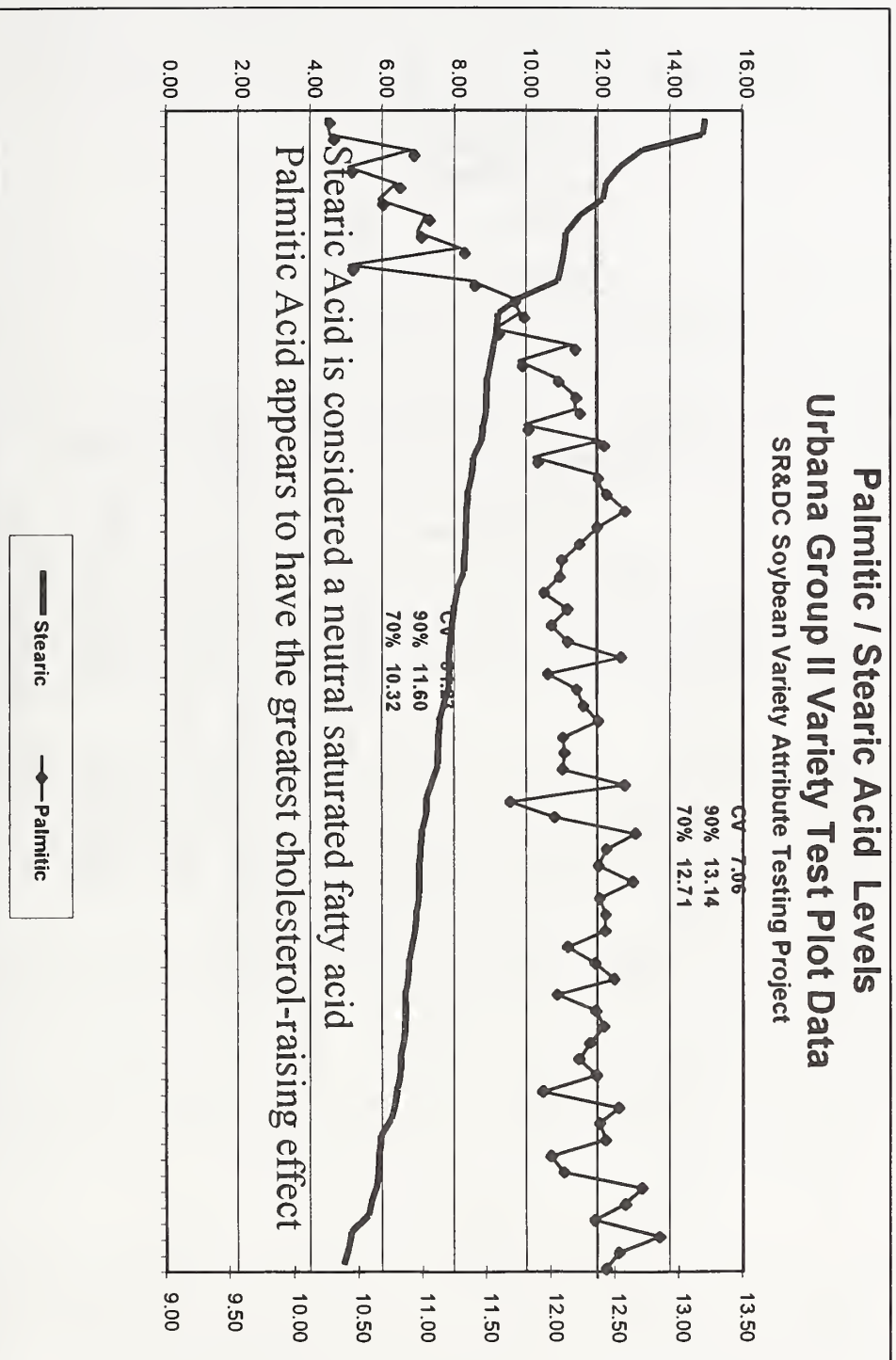
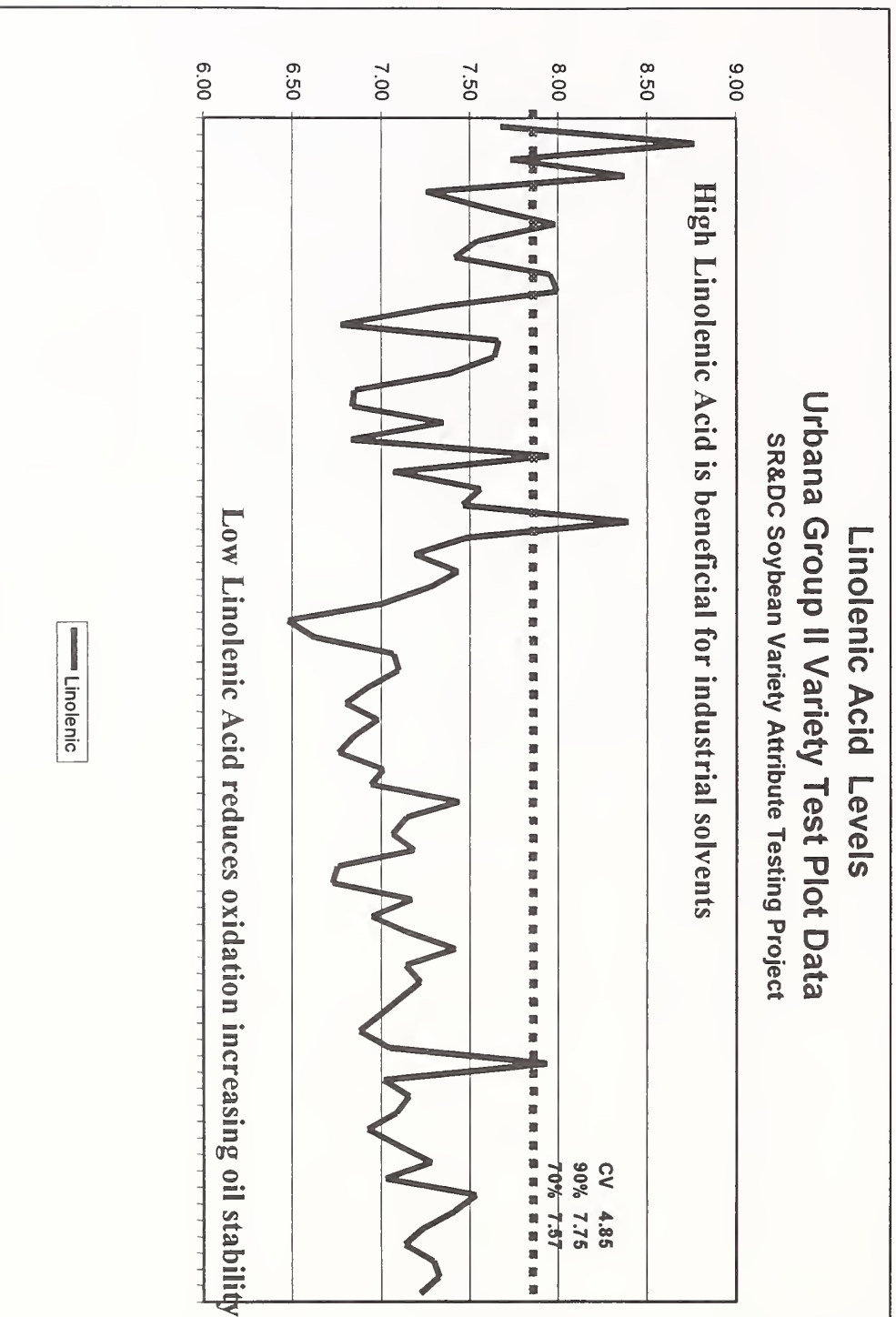


Figure #5 Linolenic Acid



OVERVIEW OF FARM DIRECT MARKETING INDUSTRY TRENDS

Monika Roth
Agricultural Marketing Extension Educator
Cornell Cooperative Extension

Background

During the early part of this century, the US food production and distribution system was more regionally self-sufficient. After the second World War, production and distribution shifted from a regional to a national/global system. Improved transportation afforded buyers the opportunity to source supplies nationally becoming less dependent on local supplies from farms at terminal markets. Supermarket chains began coordinating purchases through a central warehouse. Consequently small producers unable to meet price, volume and delivery requirements, either went out of business or turned to direct marketing as a means of diversifying income and capturing a share of the consumer dollar.

In response, pick-your-own operations and farm stands emerged in the late 50=s and early 60=s. In Massachusetts, farm marketers surveyed a year ago had an average tenure of 40 years in direct marketing. While it has the longest tenure in the northeast, farm direct marketing can now be found in every state.

Farmers' markets in the USA have a similar history only their rebirth began a decade later in the 1970's. The central marketplace at the heart of cities at the turn of the century nearly disappeared with the advent of supermarkets and suburbs. According to USDA-AMS, there were fewer than 100 farmers' markets two decades ago, compared to 2,675 farmers' markets nationwide today.

The need for alternate marketing channels for farm goods, along with economic and social forces contributed to the rebirth of direct marketing in the 60's and 70's. Increasing gasoline and food prices made shopping at a farmers' market, farm stands or pick-your-own farms more economical for consumers. Consumers dissatisfied with picked-for-transit produce in supermarkets turned to local farms for in-season fresh quality. Concurrently, the back-to-the-land movement in the late 60's and early 70's produced a new generation of farmers who followed organic practices, and consumers who wanted healthy foods less dependent upon fossil fuel for production and transport.

Producer motivation to retain a greater share of the consumer dollar and to earn an equitable wage that affords them the opportunity to stay in farming has not changed since the 1960's. What has changed in the last 40 years is the portion of the consumer dollar being captured. Expenditures for food consumed at home have increased less than 1% annually since 1970, while expenditures on travel and recreation have increased 5.5% per year. Farm direct marketers have moved from capturing a greater share of the consumer food dollar, to cashing in on entertainment dollars. Consumers have moved from a price/product orientation to a value/experience orientation. To remain viable, savvy farm direct marketers have changed in response to changing consumer interests and lifestyle.

What the Numbers Do/Don't Tell

By the 1970's, direct farm marketing via farm stands, pick-your-own farms, and farmers' markets was well established. In New York, during the 10 year period from 1974 to 1984, farm stands grew at a rate of 5%, while pick-your-own farms grew by 110% and farmers' markets by 378% (based on a survey of extension agents). Farm stands grew less rapidly because of overhead costs associated with moving into a building and staffing it.

Beyond growing in number, established farm market businesses expanded through product diversification and season extension. Unfortunately growth and expansion of direct marketing is poorly quantified. The agricultural census provides data on the value of agricultural products sold to individuals for human consumption. In the period of 1982 to 1992, census data revealed a 40% decrease in numbers of farms selling direct to consumers and the value of products sold decreased by 20%. While there was some fallout of PYO farms in the mid- to late-80's, that data seems contrary to observations of direct marketing experts.

In comparing Agricultural Census data with state surveys of farm direct marketers, significant discrepancies are revealed. A 1987 survey of New York farmers identified 6,125 farms with direct sales valued at \$112 million (NYS Dept. of Agriculture and Markets). In contrast, the 1992 Agriculture Census for New York identified only 3,453 farms with sales of \$32 million. There are now over 15,000 New York farm direct market enterprises. The number of US direct market farms reported in the 1992 Agricultural Census was 86,432, only 24,000 more than were reported in 1978 by Henderson & Linstrom in six mid-west states. The lack of credible and accurate data makes it impossible to talk about trends in farm direct marketing in measurable terms.

The significance of direct marketing in contributing to net farm income is poorly documented. Average sales per New York direct market farm reported in the census was \$4,675, while in the 1987 survey New York farm markets it was \$18,328. A survey of 409 New Jersey farm markets (1993) reported average gross sales of \$221,000 with a total value of \$189 million. The 1992 Census reported only \$11.5 million in total sales from 1,508 New Jersey farms with an average of \$7,400 per farm. The value of all farm products sold for human consumption as reported in the 1992 Agricultural Census was \$404 million.

The significance of farmer-to-consumer direct marketing relative to other agricultural activity varies from state to state. According to extension specialists in Massachusetts and New Hampshire, between 70-90% of local produce moves into direct channels. In New York, 15% of farmers were engaged in direct marketing though the value of direct sales was only 4.4% of total ag sales (1987). For the nation, 4.5% of US farms sold products direct to consumers, representing only .2% of US agricultural sales (1992 Census of Agriculture).

One finding common to the Census of Agriculture and other surveys is that direct marketing includes hobby farms, part-time farms and full-time farm market businesses. The Henderson & Linstrom (1978) study found 76% of farms had sales under \$20,000. In New Jersey (1993), 67% of farm markets had sales under \$100,000 (5% over \$500,000). In a 1996 survey of Pennsylvania direct marketers, 63% had sales under \$50,000 (9% over \$250,000) (PA Dept. of Agriculture). The lack of consistency in data collection does not produce directly comparable results.

Evolution of Direct Marketing: from farm stands to entertainment farming

Farm marketers today are as diverse as the products they sell and the methods by which they market their products and services to the customer. You will find successful year-round produce businesses that offer a full line of high quality produce (of which they grow only part) to consumers in affluent suburbs. Seasonal business base success on drawing in lots of customers with attractions and niche marketers have found success in catering to special interests such as herbs. Many farm marketers offer mail order and gift basket services and are venturing into on-line promotion and sales.

Products sold at farm markets and their contribution to sales have changed significantly in the last 30 years. In season fruit crops, tomatoes and sweet corn are mainstays, but bedding plants and pumpkins extend the season and increase the bottom line. For many farm marketers, produce is a less significant part of sales while added revenue comes from added-value products and enterprises like bakeries, delis, and full-scale restaurants.

Diversification of farm markets into entertainment includes harvest festivals, company picnics, Halloween attractions, school tours and gift shops. It is not uncommon to find over 20,000 people attending a farm harvest festival or find bus loads of school children at farms in fall. Farm markets have become a destination for families and tourists, including motorcoach travelers. Farm and ranch vacations and farm B&B's are another successful marketing strategy. Tourism industry experts say agri-tourism attractions are in demand by travelers.

Evolution of Direct Marketing: from card table to haute cuisine restaurants

Since their rebirth, farmers' markets have provided a venue for innovation in farm and food products. What began with in season vegetables and fruits has evolved to as many as 700 farm grown products available to consumers year-round (as is the case at Greenmarkets in New York City). Products include specialty cheeses, meat, poultry and fish, jams, honey, wine, plants, flowers and Christmas trees, hydroponically grown tomatoes and herbs--the list goes on. Side-by-side competition, the need to find a niche in the weekly market line up, and face-to-face customer interaction spurred agricultural innovation and produced an exciting, colorful, social, alternative shopping environment. Enhancements such as music, demonstrations, and events further entertain customers.

Farmers' markets have taken direct marketing in another direction. Farmers' markets are a common outlet for organic products. Added-value processing, sales to restaurants and specialty food stores, and special orders are significant spin-off enterprises emerging from farmers' markets.

Some farmers utilize markets as their primary sales channel, while others use a combination of direct sales channels. In locations where several markets operate per week, farmers may earn all of their income at farmers' market. Surveys of market vendors reveal seasonal sales from \$1,000 to \$100,000 or more; \$10,000 to \$15,000 is typical. In a 1996 USDA-AMS survey of farmers' markets, average vendor sales per season were estimated at \$6,229. A 1997 survey of Ithaca Farmers' Market vendors revealed average sales of \$11,500 per season. Total sales at US Farmers' Markets are estimated at 1.1 billion dollars. Fortunately, due to the efforts of USDA-AMS in recent years, there is less of a data problem with farmers' markets relative to other direct marketing channels.

Recent Evolution

Consumer interest in rekindling the bond between food and farming has produced a new direct marketing partnership--the CSA farm. Subscription farming engages consumers in sharing the risks, and sometimes work, with farmers. Producers provide a weekly food supply for which consumers pay at the beginning of the season instead of at the end. A successful CSA farm may provide food for 50-100 families on 2-5 acres. CSA farms are often organic, which adds value for consumers who want assurance that food is produced in a sustainable and humane way.

Pulled by demand, farm direct marketed goods are moving back up the marketing chain into restaurants, specialty food stores, natural food retailers, consumer and producer cooperatives. Even supermarkets, capitalizing on the success of farm direct marketing, are encouraging store door delivery of local produce. A New York chain who trains its produce managers to buy local, says "No farm is too small." By featuring local farm products, supermarkets are meeting the needs of segment of the consumer market--those interested in supporting local farms, buying local, and who perceive local to be fresher. For farmers it offers another channel for their products though price is often compromised. Have we come full circle?

Success in selling produce, plants and pumpkins has caught the attention of other farm and food producers interested in a piece of the action. Increasingly dairy, poultry and meat products are finding their way into direct channels but not without significant regulatory requirements and added cost. Goat and sheep cheeses, fluid milk, pastured poultry, pork, beef, and fish, emu and ostrich, and farm-raised deer can be found at farmers' markets and are following a similar trail through to restaurants and specialty food stores.

Benefits

The benefits of direct farm marketing accrue to producers, consumers, communities, the environment and our national food system. Producers enjoy higher returns that have allowed them to stay in farming. Because it is initially less capital intensive, farm direct marketing provides opportunities for new farmers and smaller-scale producers with limited resources. Direct marketing gives farmers the opportunity to respond to consumer needs, test new products and services, explore niche markets, and measure consumer response.

Having access to a variety of high quality, fresh, locally raised farm products is of increasing importance to consumers whether gourmet cook or low income mother trying to meet the family's nutritional needs. Consumers enjoy being able to visit a farm and interact with a real farmer. In light of growing food safety concerns, knowing where food comes from gives consumers greater confidence in the food supply.

Community impacts from direct marketing are significant. Direct market farms at the urban fringe, keep land in agriculture, make productive use of land, add to the economic diversity of the community, provide significant employment, support local businesses, utilize local resources and add to the tourism base in communities. A diversity of agricultural enterprises reduces economic risks to communities from the loss of farming.

Farmers' markets offer unique economic and social benefits. They are proven business incubators where businesses are launched and products spun-off to other market channels. They have helped to revitalize urban centers and bring back a sense of community. They bring fresh products into low income neighborhoods where grocery stores no longer exist. As an example of their economic impact, the Ithaca Farmers' Market has gross annual sales of \$1.3 million, sales beyond the Market from participating vendors add up to \$5.2 million. A total of 440 people are employed by the 120 market businesses with a total payroll of \$900,000. Additionally, vendors collect \$140,000 in sales tax each year.

Given that many farm direct market operations are small, they tend to use their land more intensively but with fewer chemical inputs. Many direct marketers have responded to consumer interest in low-input, IPM grown and organic foods. Hence, small scale farming is a compatible land use at the urban fringe. Urban farmers' markets can have a significant impact on ag land preservation. As an example, over 10,000 acres are maintained in farming because of NYC Greenmarkets.

Direct farm marketing has benefited agriculture by providing producers with an alternative consumer-oriented marketing system which can accommodate innovation and specialization increasing the options for all producers. Additionally farm direct marketing offers an entry point for new farmers and a means of regenerating agriculture. All of agriculture benefits from the role direct farm marketers play in educating consumers about farming. It provides the one remaining point of contact for the consumer with the food system. Policy choices pertaining to agriculture can be positively influenced because of this interaction.

Challenges

As one marketer put it, "in the 70's and 80's, we grew in spite of ourselves, now in the 90's, it's a different story." Challenges faced by direct marketers today include narrowing profit margins and higher costs, regulatory overload, increasing competition, and the need for constant innovation to stay ahead of consumer trends.

The cost of innovation, advertising and promotion, competition, regulatory compliance, labor, management and operations require that closer attention be paid to the bottom line, especially in larger operations. Direct marketers lack industry standards by which to measure business performance. While they track growth from year to year, there are no benchmark data on the cost of business operations relative to sales.

For part-time or hobby farmers operating costs and profit expectations are lower. At least 50% of direct marketers have sales under \$50,000. The perception of profitability in direct marketing has led many farmers and entrepreneurs to become involved only to find it more challenging and less lucrative than anticipated. Direct marketing is not a panacea for solving agriculture's income problem. Unless the size of the market expands, it becomes quickly saturated.

Farm direct retailers, unlike other retailers must live by rules that apply to farm and retail operations. Regulatory concerns include food safety, pesticides, labor and health. A checklist of regulatory compliance requirements and best management practices that apply to farm direct market operations would make compliance easier. At a community level, land use regulations may limit the ability of a direct marketer to diversify into added-value enterprises and entertainment, yet for

agriculture to survive at the urban fringe, these enhancements are often necessary to justify higher labor cost, infrastructure and taxes.

As direct marketing has diversified, there are more outlets for consumers to access farm grown goods including from supermarket retailers and specialty food stores where greater emphasis is being placed on quality, appearance and local sources. Maintaining a competitive edge in the face of competition from internal and external sources will depend on customer loyalty and responsiveness to customer needs.

Food purchasing habits, lifestyle and economic health will have a large impact on the future direction of farm direct marketing. Increased consumption of fruits and vegetables, increasing consumer interest in local food sources and concerns about food safety have changed consumer shopping habits and benefited direct marketers. Societal values associated with how and where food is grown and the connection between food production and community will influence the direction of direct marketing.

If the economy remains strong, it will support the degree of diversification in direct marketing we find today, but if the economy weakens entertainment dollars may once again be turned into food dollars and economies of scale will favor the food retailer.

In the short run, success in farm direct marketing requires knowing what customers value and what experiences they expect. Capitalizing on direct consumer feedback and tracking profit centers is critical. The unique attributes of farm direct marketing cannot be lost on the consumer: whether it is a visit to a local family-owned farm, the opportunity to interact with a farmer, or purchase fresh, high quality, locally produced foods direct from the farm.

Future success will depend on understanding the benefits derived from a locally produced, fresh food supply including agricultural preservation, open space conservation, less intensive farming practices, food security, dollars recirculated locally, jobs and greater economic security for communities. Hampered by poor documentation, means that a compelling case for direct marketing that changes consumer behavior, business practices and government policies has yet to be made. The Direct Marketing Act passed by Congress in 1976 provided funds for conducting studies on the scope and impact of direct marketing. It is time that funds be reappropriated under this Act.

In the longer run, further concentration and globalization of food supply and distribution systems will create more opportunities for local producers. Small farmers unable to compete in the homogenous, concentrated national and international marketplace, have turned to satisfying the needs and niches of local and regional markets which are under-served by large scale food and supply networks. As the gap between large and small continues to widen, more opportunities are being created for small farms who can satisfy buyers unable to justify the volume purchasing requirements of larger suppliers. A key challenge is to identify under-served markets and enhance the abilities of small scale producers and direct marketers to access these. The recommendations of the Small Farm Commission are one way to make the programs of the USDA more responsive to the needs of small farmers.

FARM DIRECT MARKETING FROM A PRODUCER'S PERSPECTIVE

Jane Eckert
Vice President

Eckert's Country Store & Farms – Belleville, Illinois

The Eckert family farm operation began in 1837 when my great, great, great grandfather brought his family to Southern Illinois from Dietzenbach, Germany. The first 366-acre farm purchased in 1847 is still owned by our family.

As future generations came into the business, more farmland was purchased. Eckert enterprises from the 1950's – 1970's included a grocery store, cannery, slaughterhouse and packing plant. We were wholesale growers and packers of over 300,000 bushel of apples and 45,000 bushel of peaches. At our peak of production, we owned over 3,000 acres.

The challenges facing us then were not much different than those facing farmers today. As wholesale growers, we did not have control over the ultimate price of our product and were subject to farm labor shortages at harvest time. Therefore, in the 1960's, we researched a new direct marketing concept just beginning at the time called pick-your-own (PYO). We converted one of our wholesale farms into a pick-your-own farm in 1964 and a second location in 1968. At one time, we had five pick-your-own sites and now manage three pick-your-own retail farms plus our Country Store complex.

While the PYO concept was totally new to our area in 1964, we struggled in the early years to sell the crop direct to the customer. However, the conversion to pick your own helped ease our wholesaling pressure of finding a market for our products and dealing with a less than reliable labor source.

The PYO concept grew and became greatly successful because of tremendous customer acceptance and our access to the St. Louis, Missouri metropolitan population. Pick-Your-Own direct marketing attracted urban families to come to the country for a special experience. We offer quality, homegrown fruit at an attractive price generally below the grocery store retail. We now see families with three generations coming to our farms to continue their tradition of apple picking.

As our PYO sales grew in the 1970's and 80's, we began to sell off all of our remote wholesale apple production acreage and packing plant to allow us to focus on the retail business. We now own and operate our Country Store complex and three pick-your-own locations. Our total farm acreage now is approximately 1,200 acres. Our direct retail apple harvest is about 50,000 bushels and our peach harvest is 30,000 bushels.

The pick your own method of retailing allows us to set our own price and not be dependent on the wholesale market fluctuations thus improving our profit margins after harvest and giving us an

immediate return on our crops.

Over the past 30 years, we have watched the changing family trends of reduced picking volumes. This change started to occur as more women entered the workforce and had less time to be at home canning, baking and cooking meals. Hence, the demand for large volumes of fruits by individual families has drastically been reduced.

To meet the needs of our changing customers, Eckert's as well as other direct farm marketers across North America are diversifying their businesses in order to keep the family farm viable. A major shift in emphasis for the direct farm retailer today has gone from "growing the crop" to "marketing the farm and the farm experience."

Our main farm & Country Store is now open 10 ½ months a year and our other two pick-your-own outlets are open for approximately three months. We currently have five family members and two spouses involved in managing the business and growing the crops. We permanently employ about 35 people and the number rises to over 300 during our busiest fall season. The crops we grow for public picking are strawberries, blackberries, peaches, apples, pumpkins and Christmas trees.

At Eckert farms we are approaching the direct marketing challenge in several ways and must often adjust our marketing plans based on the crop, the season of the year and each farm location. Here are some of the specific things we are doing to expand our direct farm sales.

1. We want to keep the customer on the farm longer by offering more retail variety and farm activities. (Our main farm location offers the following: Country store, gift shop, fudge counter, bakery, restaurant, custard shop, kids play area, petting farm, farm tours, special events and festivals.) We recognize that the longer a customer stays on the farm the more opportunity for an increased average sale per customer.

Our main farm hosts approximately 250,000 guests per year and our seasonal farms an additional 80,000 guests.

We breakdown our business into two operating companies. Eckert's Inc. is our retail business and Eckert Orchards handles the growing, retail harvest and pick-your-own. Eckert's Inc. further breaks down into departments with separate inventory, wage tracking and profit and loss statements.

2. We want to increase the average number of visits to the farm by our customers throughout the year by featuring a variety of events and activities. We offer the following activities for families with children: Easter egg hunt, craft classes, Mothers and Fathers day activities, gingerbread house making and breakfast with Santa. Our special events include craft shows, bike rides, antique tractor displays, and walks of the farm, featured food evenings and various crop-related themed activities.

Many of these events are partnered with local charitable and business groups.

The vast offerings of special events and festivals by Eckert's have put us in the local and regional tourism literature as a "farm destination." Because of our excellent regional name recognition and customer counts, we now have many groups coming to us wanting to partner and hold events on our farm.

3. In 1998, we converted one of our PYO farm locations into a Fun Farm where we added many family activities and entertainment along with our apple picking. We now charge a \$2.00 per person admission to enter this farm. We felt the improvements to the farm now justify an admission and will help fund future improvements that will allow us to stay competitive with other St. Louis family attractions.
4. Over the past five years our biggest area for growth has been our food service area which includes our restaurant, outdoor food stands, fudgery, bakery and custard shop. To meet this rising business demand, we expanded our restaurant facility in 1998 from 32 seats to 96 and now serve breakfast, lunch and dinner seven days a week. Future plans call for adding 42 more seats in 2000.

We have also begun to market our farm for family outings, company picnics and adult bus groups, which are a further extension of our improved food service facilities.

The retail diversification of Eckert's is intended to make us less weather and crop dependent while positioning us as a "unique destination and direct farm marketer." As the 5th and 6th generation family members are now involved in the business we are committed to provide not only the continuity of our business but to provide quality farm products and a quality farm experience for our guests.

We are not alone in this direct marketing endeavor. Eckert's is a member of the North American Farmers' Direct Marketing Association and we regularly attend their annual conferences to network with other farm owners who have embarked on this same direct marketing retail path. As past President of NAFDMA and a current board advisor, I see a strong future for our organization and for our members. Our membership not only includes established farm family businesses but we are also seeing many new entrepreneurs entering farm direct marketing. Some of our members are able to make their living from just a very active two-month fall season.

At our annual conferences we share our new and innovative retail and management ideas, listen to featured speakers and look ahead to what our customers will be wanting in the years to come. We want to keep our farms for future generations and provide a reasonable living for our families. Farmers don't always measure all of their rewards in bottom line profits yet with today's economic reality we must produce a reasonable return for our capital and assets.

I am optimistic that the trend of farm direct marketing will continue to grow and be recognized as an important use for our agricultural land.

DIRECT MARKETING OPTIONS: FARMERS MARKETS, RESTAURANTS, COMMUNITY SUPPORTED AGRICULTURE AND THE ORGANIC ALTERNATIVE

Steve Gilman

President, Northeast Organic Farming Association

As we approach the Millennium numerous opportunities are opening wide for small scale farmers serving local markets that have profound implications for agriculture and overall agricultural policy. Indeed, in a reversal of the long term trend of small farmers going out of business these local markets, driven by a rapidly growing consumer demand, are increasingly able to support larger numbers of farmers and specialty food operations in their locales. While roadside stands and Farmers Markets have been the traditional means for farmers to address and serve these markets, considerable additional demand -- and opportunities -- are coming from upscale restaurants and from consumers themselves, organized into Community Supported Agriculture (or CSA) projects. Add to this the increasing interest in Organically grown food -- where the market has been increasing at a sustained rate of over 20% a year for the past decade -- and direct marketing efforts that have been officially relegated to the lowly status of "niche agriculture" is taking on greater prominence all around the Country. The fact that this demand is deep and consumer driven means that local agriculture can longer be ignored by the publicly funded land grant research and extension programs or state and federal agricultural initiatives.

As a long time, small-scale farmer in the Saratoga Springs, New York area I have been basing my entire livelihood on such markets since 1976. One of my own personal measures of success is that all my markets are now within a 10 mile radius of the farm and the majority of my time is able to be spent farming, not running around marketing.

Ruckytucks Farm, named for the geological rock formations or "rocky tucks" particular to the area, is certified organic and produces some 140 specialty herb and vegetable varieties for top area restaurants and a 75 family CSA project. I stopped going to the highly popular, but labor intensive Farmers Market in town over 12 years ago in order to better meet the demands of these emerging specialty markets. The farm currently has 15 acres under intensive cultivation with some of the land double or even triple cropped over the course of an extended season from April to December -- not bad for our abbreviated Zone 5 growing season.

Driving this demand is a heightened consumer consciousness of the benefits of localism itself. Midst the standardized plenty on supermarket shelves with year round tomatoes, globally grown grapes and winter strawberries all shipped in from thousands of miles away is the growing idea of eating fresh foods in season for health, flavor and nutrition. Top chefs are hallmarking this concept and are leading the way in demonstrating the cuisine potential of unusual and underused seasonal food varieties.

Along with an increasing desire to support local farms for direct market fresh food production, consumers are also beginning to see the positive aspects of the local multiplier effect whereby their home spent dollars stay home to circulate and benefit the local economy. In many areas local farms are finally becoming valued for their preservation of open space, conservation of natural resources and promotion of biodiversity and there is a concerted public desire to preserve, support and protect them including the transference of development rights and reduced taxes.

Such localism may also be a direct result of increasing anxieties concerning the trends of industrialization, commodification and globalization of our food supply. As an alternative, the face to face transactions between farmers and consumers at Farmers Markets, for example, can forge highly satisfying direct and personal connections to one's food supply that is fun and socially rewarding -- and is quite apart from the mundane supermarket experience.

Community Supported Agriculture or CSA take this connection several steps further. Shareholders become members of the farm and share in its production -- and are also offered a wide range of choices for further hands-on involvement if they so desire. For instance, CSA farms may offer regular tours, farm events and seasonal celebrations which directly involve members and their kids in various aspects of farm life. Some CSAs offer Working Memberships where sharers can join in on farm tasks and participate along with other members in harvests and food distribution in return for reduced membership rates. The heightened social context and community of the organization is analogous to a food co-op, with opportunities for group decision making, including what crops to grow each season and helping to determine annual budgets.

To look a little more deeply into the consumer perspective of why they joined a CSA a 1995 study of shareholders, ("The Quest for Purity, Stewardship of the Land, and Nostalgia for Socialability: Resocializing Commodities through Community Supported Agriculture" by Cynthia Abbott Cone, Hamline University and Ann Kakaliouras, U. of North Carolina ranked their order of their interest in belonging to a CSA:

1. Source of organic produce
2. Source of fresh produce
3. Concern for a healthy environment
4. Support local food sources
5. Support the small farmer
6. Knowing where and how their food is grown
7. Desire to eat vegetables in season
8. Desire to reduce packaging
9. Health reasons
10. To participate in community
11. An opportunity to be connected to a piece of land
12. Price
13. Unusual varieties of food

14. A place to bring children
15. An opportunity to attend festivals and events
16. An opportunity to be around farm animals

Curiously, price as a major consideration is way down the list even though CSA members are asked to pay a lump sum, up front, before the beginning of the season to enable the farmer to cover seed purchases and other seasonal start-up costs. An economic study from the University of Massachusetts indicates, however, that compared to organic supermarket pricing, shareholders are receiving close-to-wholesale prices for their weekly supply of produce and are getting a good deal in return for their up front support.

What is most radical of all in this arrangement is that Sharers also explicitly agree to share in the vicissitudes of the growing season alongside the farmer. That protracted drought affecting the sweet corn production is also their drought, reflected in a diminished weekly share perhaps. An early killing frost puts an end to their tomatoes and eggplant. However, that cool snap in early June may bring on an extended season of super lush crops of snow peas and sugar snaps, much to everyone's delight. CSA growers usually grow a large variety of successive crops on the theory that no matter what the seasonal weather and conditions -- it's always a good year for some crops even if others might suffer.

It's also important to note that "Source of organic produce" is at the top of the preference list. While more and more urban areas are boasting organic food outlets and some conventional supermarket chains now feature sections carrying certified organic produce and products, dependable mainstream sources of top-quality organic foods are still lacking, particularly in more rural areas. The small scale local organic farm therefore becomes a primary link for consumers looking to buy certified produce and specialty foods and the consumer-direct, fresh-picked quality is highly competitive with the global distribution system.

Organic agriculture's solid ascendancy in the marketplace over the past decade is also closely linked to an overall increase in personal health consciousness and concern for the environment. Organic farming has become the practical alternative for those consumers who want to have choices in the marketplace for the food they eat and feed their children -- and how that food is grown and produced in the environment. As it is now, the only recourse for consumers concerned about genetically modified organisms in foods, for example, is to purchase certified organic products which explicitly forbid them. Otherwise the public is confronted with a wide range of genetically engineered foods, from chocolate to spaghetti, that are not labeled as such in the conventional marketplace. The certified organic label becomes the only available guarantee. At root, the public is voicing a strong demand for real choice in the marketplace, even if they only seek to actually exercise that choice on a limited basis.

This concern for health and the environment and honest labeling, I believe, is responsible for the tremendous public outpouring of support for a bona fide Organic Program last year. The record 280,000 comments, overwhelmingly critical of USDA's proposal, are concerned about much more than the "Big Three" issues of allowing genetically modified organisms, sludge and irradiation of foods to suddenly qualify as certifiable organic practices. The proposed Rule failed to grasp the underlying organic paradigm which does not merely substitute organic inputs for synthetic ones but encompasses holistic, ecological practices that work together in concert with the forces of nature.

One phenomenon particular to organic farms was noted at a recent regional Farmer/Scientist Conference held at Yale University in December. As organic farms mature and are able to balance their soils and develop the whole farm habitat the need for pest controls diminishes considerably as populations of beneficial insects and disease-suppressing soil organisms become established within the farm's ecosystem. On my own farm, for instance, a system of "strip-insectary intercropping" has established permanent habitat for beneficials right in the fields among the crops, resulting in my not having to use any pest controls at all for the past four years.

Conclusion:

The huge piles of grain left stockpiled with nowhere to go this past Fall when the Asian markets collapsed bears testimony to the inherent problems of the global marketplace for farmers. The industrialization of agriculture has led to an overproduction of commodities whose purported efficacy is vastly diminished when the regular environmental and health "side-effects" are factored in. Starvation in the World is taking place among Plenty -- and is more a function of economic and political conditions rather than not having enough food to go around, although feeding the World is always a primary justification for developing further injurious industrialized practices.

USDA has recently underscored the importance of this country's small farms to today's agriculture. The need for support of direct marketing initiatives to help these small farms cannot be overstated. At the same time, organic research and extension has received very short shrift indeed. The 1997 study by the Organic Farming Research Foundation, "Searching for the 'O' Word" concluded that less than 1/10th of 1% of USDA supported research projects both numerically and fiscally have specifically addressed organic needs or practices. Here at the door of the Millennium it is high time to rectify these omissions.

Thank you.

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**“HOME MADE” – THE PARADIGMS AND PARADOXES OF CHANGING
CONSUMER PREFERENCES:
IMPLICATIONS FOR DIRECT MARKETING**

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Changes in agricultural policies, decreases in the competitive structure of agricultural markets and the increasing dominance of non-farm activities in the food chain, have put smaller and moderate-scale agricultural operations at risk. Large operations can, because of their volume of sales, earn respectable incomes. However, smaller operations that have to rely on commodity production will, in the new policy and economic environment, face a daunting challenge. That challenge is reflected in the record low percentage of the retail cost of various commodities that accrue to farmers. As shown in Table 1, the farm share of retail prices for various commodity groups range from approximately 7 percent in the case of cereals and baked goods to 46 percent for eggs. The average farm share is 18-21 percent for fresh and processed fruits and vegetables.

Table 1. Farm value as a percentage of retail price for domestically produced foods, 1987 and 1997

Items	1987	1997
Livestock products:	Percent	
Meats	47	37
Dairy	42	32
Poultry	45	41
Eggs	54	46
Crop Products:		
Cereal and bakery	8	7
Fresh fruits	26	18
Fresh vegetables	31	18
Processed fruits and vegetables	24	19
Fats and oils	18	21

Source USDA, Agriculture Fact Book, 1998

Farmers respond to the income challenge in a number of ways: some expand their operations if conditions are favorable to that option, others choose low cost production systems, still others cease farming, while some choose to alter their product lines to focus on specialty crops, niche markets and direct marketing. Direct marketing is increasing opportunities for small and moderate-scale producers and may offer viable options for sustaining family farming in the United States. But direct marketing is not a panacea for all farms of this type. Opportunities and constraints will vary according to the location of the farm, the age, skills, experience and entrepreneurial abilities of the operator, access to information, technologies and markets. Where

the factors are conducive, direct marketing, in particular direct marketing to consumers, offer advantages of integrating farm and non-farm activities and incorporating the revenues typically attributed to off farm agents into the farm revenue stream. A cursory review of empirical evidence related to consumer preferences for direct markets helps to provide a map as to prospects for these marketing options. For some options the data is sketchy or anecdotal. But a number of studies can be drawn on to indicate the prospects for direct markets.

Prospects for Direct Markets – The Theory and the Evidence

Farmers utilize a variety of direct marketing options including -- roadside and farm stands, farmers markets, U-Pick, consumer subscription or CSA's, mail order, Internet, and others. We will only touch on a few of these options here.

We know that demographic and psychographic factors have reconstructed and is reconstructing the marketplace in multiple ways, some favorable and some inimical to farm direct marketing. The high levels of urbanization remove consumers spatially from producers and enhance prospects for indirect sales such as those facilitated by wholesalers and retailers. The high and increasing proportion of adults in the workforce favor systems that economize on search time and time spent on shopping. It also favors consumption away from home and use of more convenience – prepared foods. Needless to say, these do not immediately favor farm direct sales. It favors larger supermarkets and food processing companies, and is reflected in the small and declining share of the farm share in retail food expenditures. (See Table 1.)

On the other hand, consumer surveys have, for the past two decades, shown changes in consumer interest in achieving more healthy lifestyles including consumption of healthier diets. USDA, health professionals and popular publications have been advocating increased consumption of fresh fruits and vegetables, and more “natural” products, less fat, less sugar and salt, and more complex carbohydrates. Additionally, some consumers have become more demanding of improved flavor in foods. These latter psychographic factors are more favorable to direct markets. Moreover, an increasing proportion of consumers evidence a concern for the “family farm” and the preservation of agriculture and open space. On an *a priori* basis, one would expect, then, that the prospects for direct markets in exploiting these consumer niches are quite positive. To what extent is this supported by the evidence.

Data on Consumer Patterns and Preferences

In a study of “Ohio Consumer Opinions of Roadside Markets and Farmers’ Markets”, Rhodus et al. (1994) found that, among other things:

- over 88% of Ohio households believe they receive higher quality produce directly from the farmer
- 90% of the respondents indicate a preference “to buy their fresh fruits and vegetables **directly from the farmer**, whenever possible;
- 55% of Ohio’s households shopped at a roadside market in the August 1992 to August 1993 period; 29 percent had shopped at a farmers’ market, and 40% of these had shopped at this venue four or more times.

- respondents perceived produce quality, produce freshness, and produce prices to be better at roadside and farmers' markets than at supermarkets, but supermarkets were perceived superior in terms of convenient location to home, variety of produce, consistent supply, store promotions, and convenient location to work.
- For those respondents who did not shop at roadside markets, reasons included – not convenient/far away (45%), takes too much time (12%), not open the hours I want (4%), prefer supermarkets (18%), raise my own vegetables (18%) and too expensive (4%).
- Farmers' markets were perceived as not convenient by 60% of the households surveyed.
- 55% of households would shop at roadside markets, and 58 percent would shop at farmers' markets if they were conveniently located.

Another study of a Maine farmers' market clientele provides further support for the positive view of the prospects for direct markets. Kezis et al. (1999), in their study of the Orono Farmers' market found that quality, support for local farmers, and atmosphere were very significant to patrons. (Table 2.)

Table 2. Most Important Reasons for Shopping at the Orono Farmers' Market (percent distributions*).

<u>Reason</u>	<u>Percent</u>
Quality of the products	72.5
Support local farmers	59.6
Friendly atmosphere	38.2
Health & food safety concerns	29.8
Convenience	13.5
Good price	10.7
Variety	8.4
Good service	5.0
<u>Consistency</u>	<u>2.2</u>

*N=178: excludes those who were visiting the market for the first time

Consumers also indicated a willingness to pay more for produce at the farmers market than for similar produce at a supermarket, with 72 percent indicating a willingness to pay an average of 17 percent more for farmers' market produce. And nearly half of weekly patrons reported spending upwards of \$10.00 per visit.

Data from an as yet unpublished California survey conducted in San Diego County, California, in 1998, confirm the trend toward enhanced consumer preferences for direct markets. Table 3 shows the relative familiarity with and use of alternative direct marketing methods from a survey of 436 consumers. With respect to the factors that favor their patronage of farmers' markets the responses ranked in order of frequencies are as follows:

Table 3. Factors Favoring Patronage of Farmers' Market.

	Count	Percent
Freshness	399	92.0
Quality	379	87.0
Taste	339	76.0
Locally Grown/Produced	308	71.0
Help local farmers	259	59.0
Nutritional value	211	48.0
Atmosphere	201	46.0
Best value for money	177	41.0
Convenience	164	38.0
Price	157	36.0
Know grower	62	14.0
Others	34	8.0

(a) Consumers could chose multiple responses

(b) Rounded to nearest percent

Source: Lobo et al. Unpublished study of San Diego Farmers' Markets: Consumer Preferences and Shopping Patterns.

The top four attributes were identified in the survey as Quality, Freshness, Taste, and Help Local Farmers/Locally Grown. Approximately equal proportions of the sample – about a third perceived prices to be higher or lower than supermarket prices. However, 73 percent perceived quality to be superior to supermarket produce, a surprising finding given the proximity of supermarkets in California to production areas. Two thirds of the respondents would prefer items to have a San Diego grown label and a half indicated a willingness to pay more for San Diego grown products.

Table 4 presents data from the 1997 Annual Report of the Southland Farmers Market Associates:

Table 4. Average Farmer Gross Sales Per Market Day, 1997

<u>Southland Markets</u>	
Santa Monica Wednesday	\$894
Westwood	\$792
Santa Monica Saturday	\$705
Santa Monica Pico	\$620
Calabass	\$567
Beverly Hills	\$560
Encino	\$446
West Hollywood	\$442
Gardena	\$408
Culver City	\$394
Ocean Beach	\$368
Redondo Beach	\$322
Adams & Vermont	\$304
Oxnard	\$292
San Dimas	\$287
Monrovia	\$254
Palmdale	\$174
San Gabriel	\$141
Average farmers' sales, all Southland Markets	\$438

As indicated, per farmer per market day sales ranged from a low of \$141 to a high of \$894 – with an average per market day sales of \$438. This is not an insignificant amount of revenue, particularly when considered in the context of farmers selling at more than one or even multiple markets.

Table 5 presents a summary of annual sales for the 19 markets in the Southland Farmers' Market Association for 1997. Annual sales ranged from a low of \$47,437 for partial year's sales for the San Gabriel market, to a high of \$3,599,629 for the Wednesday, Santa Monica market. It should be noted that the Southland markets are in the Los Angeles Basin.

Table 5. Gross Sales of Current Southland Markets – Five Year Comparison

	1993	1994	1995	1996	1997
Adams & Vermont	\$272,700	\$270,000	\$263,500	\$253,210	\$251,691
Beverly Hills	--	\$310,500 #	\$708,000	\$876,606	\$902,368
Calabasas	\$418,600 #	\$720,100	\$742,000	\$941,177	\$918,328
Culver City	--	--	\$406,300 #	\$498,356	\$559,894
Encino	--	\$185,100 #	\$355,500	\$567,607	\$695,638
Gardena	\$398,000	\$418,400	\$389,000	\$406,279	\$414,108
Monrovia	\$200,200	\$240,900	\$173,100	\$281,649	\$294,913
Ocean Beach	\$375,200	\$415,400	\$371,000	\$469,559	\$570,200
Oxnard	\$186,600	\$229,400	\$225,500	\$235,970	\$175,367
Palmdale	--	--	--	\$ 86,196	\$ 86,269
Pomona	\$345,500	\$315,600	\$313,500	\$270,985	\$241,620
Redondo Beach	\$511,700	\$487,800	\$440,000	\$415,503	\$404,179
San Dimas	\$347,100	\$284,700	\$268,500	\$258,544	\$254,601
San Gabriel	--	--	--	--	\$47,437 #
Santa Monica - West	\$3,896,500	\$3,485,100	\$3,535,000	\$3,723,703	\$3,599,629
Santa Monica - Sat	\$810,700	\$864,200	\$1,025,000	\$1,539,209	\$1,660,381
Santa Monica - Pico	\$794,600	\$1,051,700	\$1,060,000	\$1,444,766	\$1,427,210
West Hollywood	\$420,900	\$418,600	\$406,000	\$380,269	\$394,624
Westwood	--	\$522,745	\$845,000	\$1,482,883	\$1,613,032

NOTES # means partial year

Source: 1997 Annual Report - Southland Farmers Association, Los Angeles, California, 1998

Clearly, these operations go beyond the uninformed perception of farmers' markets as inconsequential 'mom and pop' operations. Many have emerged as serious marketing and economic institutions. And by no means do they appear to have exhausted their potential. Certainly feasibility analysis and planning, as well as progressive management will determine the outcomes of specific markets. The bottom line, however, is that consumer lifestyles and preferences are supportive of further development of farmers' markets as sites for exchange of values between consumers and producers.

Mail Order

The busy lifestyles of many middle income households and the appeal of foods and farm products for ceremonial purposes offers potential for utilizing mail-order and electronic commerce as marketing options for farmers. The business skills and marketing infrastructure needed to support mail order or electronic commerce are probably at least different, if not more complex than for roadside stands or farmers' markets. But some operations will be favorably endowed with these skills. Others can be developed. But there is clearly a potential market.

According to Consumer Reports (1996), in 1995, 6.4 million Americans ordered food by mail. Products sold included: nuts, fruits, preserves, cheeses, meats and fish, baked goods, and confectionery. While, according to Consumer Reports, product quality and service was highly variable, consumers appeared willing to pay considerably more than supermarket prices for the convenience and "panache" of ordering through the mail. Since many of these items are sent as gifts to friends, business and personal acquaintances, consumers avoid the time to shop, package and ship the products. Moreover, value is added by virtue of the product having some added identity as provided by a label or some valued source of origin – like a family farm.

Table 6 shows some typical price differentials between mail order products and their supermarket equivalent:

Table 6. Prices: Mail Order vs. Supermarket Prices

Food	Mail order	Supermarket
Popcorn	\$31.90	\$10.61
approx. 3 1/2 gal.	Popcorn Factory	Wise
Mixed nuts	\$22.10	\$4.80
1 lb.	Swiss Colony	Planters
Cheddar	\$13.15	\$3.62
1 lb.	Sugarbush Farm	Cracker Barrel
Salmon	\$57.90	\$19.99
1 lb.	Pfaelzer Brothers	A&P deli

Source: "The Food is in the Mail".

Consumers Reports, November 1996

As shown in Table 6, price differentials between mail order and supermarket prices for comparable products are typically substantial.

Paradoxes in Consumer Trends

A key paradox of evolving patterns of consumer preferences is that as disposable incomes increase in inverse proportion to discretionary time, preferences for "home made" products which either evoke comforting feelings of nostalgia or romantic images of home and hearth motivate much consumer spending. This explains why many large food processors and fabricators including Campbell's Soup Company and many others go to great lengths in developing products and labels that convey this image of a romantic peasant society and cottage industry production. Not only is this true for foods, it extends to handicrafts such as quilts, Shaker furniture, hand loomed woolen sweaters, and the like. Hence, the nostalgia for "authentic" products offers niches for direct market, for fresh and value-added products from small and moderate scale farms. But producers will need to combine "authenticity" with up-to-date practices in regard to product safety, warranties, service and customer relations. Another paradox of consumer trends is the increased consumption of "fast food" and convenience foods by lower income consumers.

Conclusions and Implications

This paper suggests that there is still rich potential for improving the performance and prospects for family farming through direct marketing alternatives. These alternatives demand many more entrepreneurial skills and abilities than traditional marketing alternatives. Many of these skills can be transferred to farm entrepreneurs. They could also benefit from exposure to methods of conducting market research and accessing pertinent sources of consumer information. These include topics that can be addressed by USDA and its partners through applied research and

education. Activities and new initiatives now being implemented by the Agricultural Marketing Service are justified by the potential pay off for family farmers.

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ECONOMICS, FOOD CHOICES, AND NUTRITION

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Consumers make dietary decisions based on economic, physiologic, psychologic, sociologic and even spiritual considerations, with hardly a nod to societal implications (see, for example, Nestle, et. al, 1998). Eating in a developed country such as the United States becomes a social and family event, an act of pleasure, that goes far beyond the ingestion of the necessary nutrients to sustain life. People eat for *both* pleasure and as a biological necessity. This must be remembered if we are to understand the complex world of food choices, dietary quality, and change.

Complexity necessitates simplification and abstraction. Human behavior is complex, economic relationships are complex, nutrition is complex; put them together and the entanglements are limitless. We must have a framework to help us sort through the possibilities; abstracting from the realities of life is a requirement, not a choice. Human behavior is so complex that to understand anything a great deal must be assumed. Differences of opinion are a natural outcome of intellectual inquiry. Joan Robinson probably said it best: "The analysis can be extended to any degree of refinement but the more complicated the question the more cumbersome the analysis. In order to know anything, it is necessary to know everything, but to talk about anything, it is necessary to neglect a great deal" (Robinson, 1941).

Many forces, most outside the consumer's direct control, shape food demand and food consumption behavior. In Senate testimony more than 20 years ago, Dr. Winikoff of the Rockefeller Foundation said of nutrition, "it is affected by governmental decisions in the area of agricultural policy, economic and tax policy, export and import policy, and involves questions of food production, transportation, processing, marketing, consumer choice, income and education, as well as food palatability and availability. Nutrition is the end result of pushes and pulls in many directions, a response to the multiple forces creating the 'national nutrition environment'" (Senate Report, 1977). We focus our attention on factors influencing consumer food choices.

Our objective is to examine empirical evidence on the role and influence of economic factors, defined rather broadly, on food choices and subsequent hence, nutritional outcomes. It is not an exhaustive review, but rather we focus on selected studies whose conclusions appear to be supported by a preponderance of the literature. Our goal is to do this in a non-technical fashion. We examine factors such as food prices, household income, nutrition knowledge and awareness, time constraints and time preferences. We do break with the central design of the paper in the last section where we discuss some new, as yet unpublished, findings.

The Basic Economic Framework

One tool frequently used by economists to examine how various factors affect consumer choices is the household production model. The basic idea is that households are producers as well as consumers. They maximize satisfaction by consuming commodities they produce by combining time, human capital, and purchased goods. For example, a household may purchase a variety of food items and combine them with cooking skills, nutrition knowledge, preparation time, and kitchen appliances to produce good nutrition. The objects of desire--nutrition or health--are produced with inputs of market goods and time. This model's success stems from its integration of biological, sociodemographic, and economic factors, all of which are at work in household consumption decisions (Becker's (1965), Lancaster (1966)).

In the household production model, production activities are always subject to available technologies, income, time constraints, and other household resources used to produce nutrition and health. Technology constraints introduce biological and sociodemographic factors into the household decision process. For example, each family member's health is produced by combining time, health inputs, the sociodemographic characteristics of the household, community characteristics, and the genetic endowment of the individual. These production processes are often interrelated because some intermediate goods produced by a household such as meals are often used as inputs into the production of a final commodity, like health.

The income constraint ensures that the household expenditure on purchased goods and services does not exceed money income. The time constraint ensures that the sum of all time inputs into the production of commodities plus leisure time and time spent at work does not exceed the total time available. The income and time constraints are also intertwined since labor earnings depend on time spent at work and the more time spent working means less time available for meal preparation and other household activities. These interlinkages are sometimes characterized in the old adage 'time is money.'

Households attempt to maximize their satisfaction by taking into account the prices of purchased inputs, wage rates, household income, as well as their sociodemographic characteristics to derive their demand for commodities (such as nutrition and health) and market goods (such as foods and medical services).

The use of the household production model to study the determinants of health, health behaviors, and health inputs was pioneered by Grossman (1977). Grossman's approach grew out of the recognition that many consumer choices, such as those relating to the amount of exercise, the nutritional quality of diets, and the purchase of medical services, are not made because consumers gain utility from these choices directly, but rather because these choices influence health. Health, in turn, is demanded because it is a source of utility and because it determines income, wealth, and overall well-being.

One distinctive element of the economic approach is the framework used to understand and quantify life's tradeoffs. In our view, consumers face four fundamental, but not necessarily mutually exclusive, tradeoffs in the food choice and nutrition arena. The first is between nutrition and taste. Can information or product development improve the terms of this tradeoff? The

second tradeoff is between nutrition and costs -- the usual refrain that it costs too much to eat healthily. In modern America, the tradeoff between nutrition and convenience is of paramount importance as incomes increase and time constraints become tighter. Time is, of course, the ultimate equalizer; everyone is limited to only 24 hours a day. The fourth tradeoff is between known short-term costs -- in terms of time, money, and perceived sacrifices in taste -- and the uncertain long-term benefits of healthy eating. Given this paradigm, what can economists contribute to solving the mystery of *why Americans with an abundance of nutrition information, high incomes, and low food prices don't eat better?*

The Old Standbys: Prices and Income

The Federal government has conducted many nutrition education campaigns to help consumers make healthy food choices, but economic factors such as food prices and consumer income are also important determinants of food choices with direct consequences for nutrient availability. For example, if the price of beef increases while the price of chicken remains the same, consumers will buy less beef and more chicken. However, other foods -- such as hamburger buns and cheese -- will also be affected. The same principle applies to consumer income. Consumers have budget constraints to live within -- one dollar spent on chicken is one less potential dollar for beef. Supermarkets often with more than 150,000 different brands and products available on their selves, are full of these potential tradeoffs for consumers (Gallo, 1996).

Rising income has been a major factor influencing food choices. In general, higher income has two results: it expands the set of potential purchases and earning it takes time. Consequently, income is inextricably linked to the demand for convenience foods and food away from home.

Over the past two decades, the overall price of food has risen about the same as that for nonfood while consumer incomes have risen dramatically (Putnam and Allshouse, 1997). Together this means that food is more affordable than ever -- Americans spend only about 11 percent of their incomes on food -- and higher incomes allow consumers to purchase higher quality foods, eat foods considered more enjoyable, and dine out more often (Putnam and Allshouse, 1997). The American Heart Association identified easily affordable food as one of the root causes of the over-consumption that is making obesity a major risk factor for heart disease (AHA press release, 1998). However, some people believe that food prices are still a barrier to healthy eating. A 1995 survey by the Food Marketing Institute and Prevention magazine found that 51 percent of consumers agreed with the statement "It costs more to eat healthy foods." In some ways this is true and may particularly impact low-income consumers. Frazao and Allshouse (1996) found that food products modified in fat, sodium or other food constituents generally cost more than their standard counterparts (See also Nestle, 1994). If consumers believe that dietary change requires using these specialty products, they will perceive change to cost more. Frazao and Allshouse also found that sales volume for all 37 food categories analyzed rose 10.9 billion pounds from 1989-93 with nutritionally improved versions contributing 78 percent of that increase. However, other research indicates that it is possible to eat healthy using standard products that are less expensive, but perhaps require some sacrifices in taste (McAllister et al. 1994).

Understanding Price Changes

Several recent studies have examined the complex changes in consumption that would result from price changes for various commodities and the subsequent impact on the availability of nutrients in the US food supply (Huang, 1993, 1996). These studies found, for example, that an increase in beef prices decreases daily availabilities of calories, total fat, cholesterol, protein, and saturated fat and increases the availability of vitamins A and E. However, it decreases the availability of calcium, iron, and fiber. These results highlight the interdependence among food choices. For example, an increase in the price of beef is associated with decreased consumption of some grains, fruits, dairy products, and vegetables, which explains the decreased availability of fiber and calcium. Because of the interdependence of food choices, well-intentioned proposals such as a “fat-tax” need to be carefully analyzed for any unintended implications.

Income and Convenience

Several economic studies have estimated the effects of economic, regional, and demographic variables on food expenditures (Blisard and Blaylock, 1993; Blaylock and Smallwood, 1986). The more recent analysis found that food away from home was 3 times more responsive to income changes than food at home but found mixed evidence that rising incomes increase the demand for individual high fat and cholesterol foods. The largest income response for an individual food was for “other dairy,” a mixture of low- and high-fat items. The second most responsive food was fresh fruit, very low in fat and cholesterol. However, cheese, a high-fat item, had a relatively high income response.

Comparing income responses between the two studies gives an indication of changing economic responses over time, which may be caused by changes in incomes or consumers perceptions of food qualities. In general, the more recent study found lower income responses than the earlier one. Food away from home retained its very high response to income, but the response of food at home dropped sharply. The income responsiveness of meat, poultry, fish and eggs declined by 50 percent, while the income responsiveness of eggs became negative, consistent with other studies. Fresh fruit became more responsive to higher income, while butter’s response declined sharply. This evidence supports the notion that responses to income change over time as consumers reevaluate foods’ characteristics. These changes are consistent with a shift toward healthier diets, although changes in relative prices and other factors cannot be ruled out by examining just these two independent cross-sectional studies.

Two recent studies have explored the effect of information by examining national consumption and price data for cholesterol and the fats and oils complex. (Brown and Schrader, 1990; Yen et. al., 1996) Brown and Schrader found that the increase in information about cholesterol decreased per capita egg consumption 16 percent over the 1955-1987 period. Yen et. al. found that information changed demand for fats and oils; in particular, resulting in reduced consumption of butter and lard, but not necessarily all fats and oil. Thus, it is not inevitable that affordable food will defeat nutrition information in determining diets.

In summary, evidence is somewhat mixed on the impact of rising income on the demand for individual foods with particular nutrient profiles has increased or decreased. In sharp contrast to

the above, there is no debate that food away from home is becoming ever more popular and that income and economic forces are the major determinants. The reasons are well-known: higher incomes, convenience, more women in the labor force, and smaller households. The frequency of dining out increased by more than two-thirds over the past two decades rising from 16 percent of all eating occasions in 1977 to 27 percent in 1995 (Lin, Frazao, and Guthrie, forthcoming). Consequently, a greater proportion of nutrient intakes have been obtained from away-from-home food sources. For example, food away from home provided 34 percent of total caloric intake in 1995, nearly double the 19 percent in 1977. Similarly, away-from-home foods provided 38 percent of total fat intake, 29 percent of total calcium intake, and 27 percent of total iron intake in 1995, compared with 18, 17, and 16 percent, respectively, in 1977.

Rising consumption of food away from home may make it more difficult for consumers to make informed choices regarding the nutritional content of meals. Many people, including many dietitians, have a very difficult time measuring the nutritional quality of a meal or a mixture of foods. In fact, 203 dietitians were asked to guess the amount of fat and calories in 5 prepared meals (Center for Science in the Public Interest; New York Times, 1998). They were generally way off the mark. For example, a hamburger and onion rings, with 1,550 calories and 101 grams of fat, were surmised to have only 863 calories and 44 grams of fat. This has become an increasingly important problem in our society as dining out, fast foods, home delivery, and prepackage meals become an ever growing part of our culture. People may be aware of the nutrient content of a particular food but the situation becomes more complex when foods and ingredients are combined in unknown portions with unknown preparation methods.

A recent study has also shown that between 1977-1995, smaller nutritional improvements occurred in foods prepared away from home than in home foods, and, in 1995, away-from-home foods typically contained more of the nutrients over consumed and less of the nutrients under consumed by Americans than home foods (Lin, Frazao, and Guthrie, forthcoming). For example, fat provided 41 percent of calories for both home and away meals in 1977. By 1995, the fat content of home foods had declined steadily to 32 percent of calories but only to 38 percent for foods away from home. A similar story holds for saturated fat.

Interestingly, since food away from home contains more fat and cholesterol and less fiber, its higher income response could counter improved knowledge and attitude effects that may come with higher income. This question is addressed later.

Perceptions Often Do Not Match Reality

Nutrition advice is often given, with some notable exceptions, in terms of eating less of this nutrient or more of another. This advice rests on the assumption that people know not only what nutrients are in the food they eat, but also the quantities -- especially difficult information to obtain when dining at the local cafeteria or steakhouse. Herein then lies the dilemma: What if actual intakes vary significantly from perceived intakes? All the dietary advice in the world will fall on deaf ears if people *believe* their diets are meeting dietary recommendations. Unless someone is gaining unwanted weight or experiencing some health problem they are likely to reach the reasonable conclusion that nutrient supply equals nutrient demand. That is, change is not necessary. The evidence is not encouraging. Approximately 30-percent of Americans believe

their diets contain about the right amount of fat for a healthy diet and another 46 percent believe their diets contain too much fat (Bishow, Blaylock, and Variyam, 1998). The fact is that both groups obtain 37 percent of their calories from fat sources. Both of the groups present challenges for nutrition educators. The optimists may not respond to nutrition advice since they believe their diets conform already to dietary guidelines and the realists simply may not see a need for change.

Time Preferences and Constraints

Today's nutritional issues are driven by the discovery of strong links between nutrition and chronic diseases, such as coronary heart disease, cancer, and stroke. Nutritional concerns now focus on excessive consumption of fats, saturated fats, and sodium and the under consumption of some nutrients and food components, such as calcium, dietary fiber, and iron. Whether the problem is over-or-under consumption, the common denominator is that the associated health outcomes are often slow to manifest themselves and in many cases may never appear. This uncertainty and delayed impact effects consumer behavior. There is simply no guarantee to a consumer that a lifetime of healthy eating will result in reduced morbidity outcomes or increased longevity. Perhaps all that is required is to begin practicing good nutrition at some point in life or substitute medical inputs for that low-fat, high fiber diet. Economists simplify these behavioral phenomena into a factor often referred to as time preferences.

In the long-run, taste considerations may simply prevail; habits and other forces may be too difficult to overcome. Similarly, the uncertain future benefits of better nutrition -- you have to die of something -- may outweigh the perceived potential benefits of healthy eating. Put differently, for many people healthy eating is just not worth the effort and sacrifice. The latter may be a particularly difficult phenomena to overcome since Americas seem to discount the future heavily. We need to look only at the nation's extraordinary low savings rates or the high credit card balances for evidence. Convincing people of the long-run benefits of good nutrition is clearly made more difficult if immediate gratification is given a higher priority.

Time constraints are another important consideration. Time is required to obtain nutrition information and to purchase and prepare nutritious food competes with time that could be used in labor markets, for leisure, or at the shopping mall.

Time constraints also affect the gathering of nutrition information. A consumer seeking nutrition information can use a variety of sources, each with a time and monetary cost and a perceived contribution to their well-being. Advertisers' information will have the lowest cost, but not necessarily the highest perceived contribution. Generally, consumers obtain information from sources low in search costs, but value information from other sources more highly. In one poll, respondents cited print media and TV as the most common sources of nutrition information, but cited doctors, books, and dietitians as the most useful. Family and friends fell in between. This apparent discrepancy between use and usefulness is consistent with the costs of information sources; information from medical professionals is both expensive (in time and money) and rarely used. Gleaning information from books takes time and is rarely sought. Virtually free information through the mass media is widely used, even if given marginal value.

Food is the second most advertised product category (Gallo, 1996). With a bewildering array of food items from which to choose, research indicates that the average consumer takes only 12 seconds to make a brand selection with nearly half choosing in one second (Moorman, 1996). That is not much time to compare prices or check a nutrition label. Of course, Madison Avenue with sixteen billion advertising dollars seeks to help us here. Not surprisingly, most of these advertising dollars promote prepared and convenience foods, snacks, and alcoholic beverages. As a reference point, the Federal government spends about \$326 million annually promoting the Food Guide Pyramid and other healthy eating practices (USDA Report to Congress, 1995).

Time constraints were cited as an obstacle to better nutrition by 21 percent of consumers (ADA, 1995). Mothersbaugh et al. (1993) found that time constraints had a negative effect on an individual's adherence to recommended dietary practices. However, increased nutrition knowledge, such as better meal planning and preparation skills, offset the negative effects of time constraints. Confusion about dietary advice is also a form of time constraint. About 21 percent of consumers agreed that there are so many conflicting studies they don't know what to believe (ADA Nutrition Trends Survey). This makes it very time intensive, or impossible, to sort through the masses of information. The development of the *Dietary Guidelines for Americans*, which give a clear and consistent message to consumers about what they should eat to be healthy, is one approach to solving this problem. Continued promotion of the Dietary Guidelines as a source of consistent, reliable advice may help overcome this barrier (Sutton et al., 1995).

Nutrition Knowledge, Attitudes, and Awareness

Most paradigms assume that when the consumer is provided with knowledge -- nutrient content of foods, for example--attitudes toward diet will change, resulting in changed dietary behavior. However, knowledge by itself will not affect behavior; motivation must be provided. The motivational knowledge could be that healthy eating will produce better health and reduce risks of chronic diseases. Of course, the costs of acquiring and processing information are important constraints.

One convenient way of characterizing nutrition is the Rogers system, which identifies three types of knowledge: awareness, knowledge of principles, and awareness of diet and health relationships (Rogers, 1983). To this list, we would suggest adding attitudes and barriers to change.

Awareness of Diet and Disease Relationships

Awareness of a relationship between diet and health is assumed to be the first step in motivating interest for acquiring knowledge about healthy eating choices. Americans show fairly high levels of awareness of relationships between diets and chronic disease, such as heart disease and cancer (Levy and Heimback, 1989; Ippolito and Mathos, 1995, 1996). In general, consumers are aware of health problems associated with many nutrients. For example, 71 percent of consumers are aware of health problems associated with how much fat a person eats; 59 percent are aware of the health/saturated fat intake, but only 48 percent are aware of the association between health and iron intake (Variyam, Blaylock, and Smallwood, 1997).

Furthermore, consumers are becoming more aware of diet/health relationships. Less than 20 percent of consumers were aware of a linkage between fats and heart disease in 1982, but more than 25 percent now know of the link between cholesterol and heart disease (Guthrie, Derby, and Levy, 1998). By 1995, 60-percent of consumers know of the fat/heart disease association, far out pacing cholesterol in the public's eye as the key dietary risk factor for heart disease. Interestingly, saturated fat has not penetrated the public consciousness. Only about 5 percent of consumers thought the relationship between saturated fat consumption and heart disease was an important risk factor, unchanged for 13 years.

Awareness of links between diet and cancer has also increased but is below levels for heart disease. In particular, more than 30 percent of consumers mention fruits and vegetable consumption as associated with cancer, up from about 15 percent in 1984 (Levy and Derby 1995, 1996).

However, awareness of health problems associated with diets is not a panacea. Awareness of the link between weight and health is virtually universal, but obesity is a widespread problem (Kuczmarski, et al., 1994). The same is true for calcium. Despite widespread knowledge of calcium and health relationships, consumption is still below recommendations for women over age 20 (Tippett, et al. 1995; Food Surveys Research Group, 1996). Other factors are clearly intervening.

Knowledge of Nutrition

Knowledge of nutrition can take two general forms: knowledge of principles (e.g., advice about the percent of calories that should come from fat) and knowledge of the specific nutrient content of a food. The extent of consumer knowledge in these areas is mixed (Levy, Fein, and Stephenson, 1993). Only 33 percent of consumers know that saturated fat is more likely to be a solid while 39 percent are aware that cholesterol is found only in animal products (Variyam, et al. 1997). In terms of knowledge of the nutrient content of foods, consumers do better. For example, almost 90 percent of consumers know that regular hamburger contains more fat than ground round; butter contains more cholesterol than margarine; and white bread has less fiber than wheat bread (Variyam, et al. 1996, 1997).

Knowledge of nutrition principles, like awareness, is not a panacea. Despite high levels of knowledge, fiber consumption is low and fat consumption is high, suggesting intervening factors, such as the demand for convenience, dining out, and taste considerations are having a significant influence.

Attitudes About Attributes

Nutrition knowledge arms the consumer with tools for instituting change but the consumer's attitude determines whether the motivation exists for making the change (Axelson and Brinberg, 1989). Attitudes are subjective and involve the tradeoff between one attribute of a food, meal, or diet against another. If consumers do not value the nutritional qualities of foods more than taste, convenience, or price then they may not choose nutritious foods, regardless of knowledge levels.

Surveys by the Food Marketing Institute indicate that more than 75 percent of consumers place a high value on nutrition, but almost 90 percent value taste and 64 percent think price is very important (Food Marketing Institute, 1989, 1995-97). Evidence from USDA surveys indicate that 67-percent of consumers believe choosing a diet with plenty of fruits and vegetables is important; 61 percent a low-fat diet; and 37 think people should eat at least two servings of dairy products daily (Guthrie, Derby, and Levy, 1998). Seventy-five percent thought it very important to maintain a healthy weight (Guthrie, Derby, and Levy, 1998). Positive attitudes about nutrition may motivate change; negative attitudes present a barrier. A American Dietetic Association survey indicates that 38 percent of consumers believe that to improve their diets requires giving up favorite foods (ADA, 1995).

ERS Studies of Nutrition Information

Economic Research Service (ERS) has been conducting recent studies using data on individuals to explore the influence of nutrition knowledge, attitudes, awareness of diet/health links, income, education, and personal and household characteristics on diet quality and nutrient intakes. ERS has published detailed analyses of consumer intakes of fat, cholesterol, fiber, and as well overall diet quality (Variyam et al, 1997, Variyam et al, 1995, Variyam, et al., 1998). Recent work has focused on examining the influence of a mother's nutrition information on the diets of her children. These studies use two surveys of the same population: the Continuing Survey of Food Intakes by Individuals (CSFII) and the Diet and Health Knowledge Survey (DHKS) of USDA. The CSFII is an interview and diary record of food ingestion for a three-day period. The DHKS is a follow-up telephone survey with the "food managers" of the responding households, and contains questions on knowledge and attitudes about nutrition.

The ERS work is unique in several ways. First, direct measures of nutrition knowledge are used. Previously, only Kenkel in the health area has used direct measures of information to examine the demand for physician services and the role of schooling in the choice of healthier habits (Kenkel, 1991). Prior studies have used proxies for nutrition knowledge, such as years of education or income that may account for information differences among people. The problem with this approach is that such variables have a direct effect on health input choice, besides their indirect effect on input choice through information. These direct and indirect effects cannot be separated without explicitly modeling information separately from diet quality or nutrient intake, that is, treating information as an endogenous factor. This has the important implication that key diet quality determinants, such as education and income, as well as other personal and household characteristics may influence both quality and nutrition information levels simultaneously. For example, this approach allows the separation of income effects into a direct effect on quality because of purchasing power or time constraints and an indirect effect through nutrition knowledge. Consequently, it may be the case that income increases fat intakes because it increases the demand for fatty meats but at the same time, since income and nutrition information levels are related, it may have a dampening impact on fat intakes. Heretofore, these types of impacts could not be separated. Lastly, the ERS approach assumes that nutrition information cannot be directly observed (a latent variable) but can only be indirectly measured via various indicators. For example, questions probing diet-health awareness were combined to form a

single underlying measure of diet/nutrition knowledge (see Table 1 for examples). Similarly, questions on nutrient content knowledge were used to form a specific measure of content knowledge.

Research Findings from One ERS Study

A recent ERS study examined the influence of maternal nutrition knowledge and other maternal characteristics on the diet quality of children between 2 and 17 years of age. Diet quality is assessed using the Healthy Eating Index, U.S. Department of Agriculture's instrument for measuring overall diet quality incorporating 10 recommended nutritional guidelines (USDA, 1995). Much of the existing research on a maternal role in children's health and nutrition is in the economic development literature (Barrera, 1990; Behrman, 1995; Behrman and Wolfe, 1987; Haughton and Haughton, 1997; Kassouf and Senauer, 1996; Senauer and Garcia, 1991; Thomas and Strauss, 1992), and only a few studies have provided direct evidence on the role of information (Thomas, Strauss, and Henriques, 1991). Relatively little is known in the U.S. context about the relationship between a child's diet and the nutritional literacy of the person responsible for meal planning or preparation--often the mother. The existing U.S. evidence linking parental nutrition knowledge and children's intake of nutrients is mixed (Colavito et. al., 1996; Klesges et. al., 1991). Lack of controls for measurement errors and endogeneity of parental nutrition knowledge may have contributed to these inconclusive results.

Presented in Table 1 is a sample of the types of indicators used to develop the measures for nutrient content knowledge and awareness of diet-disease relationships. While nutrition knowledge may be increasing for the population as a whole, levels vary widely among different population groups. For example, income and education have similar effects: the more you have the more you're aware of diet-disease relationships and the more nutrient content questions you can answer correctly. Whites answered more nutrient content questions correctly and were more aware of diet-disease relationships than nonwhites. Ability to answer nutrient questions also varied by ethnicity. Knowledge differences varied little by mothers' age.

Maternal Knowledge and Childrens' Diet Quality

The ERS study found significant evidence that greater maternal health and nutrition knowledge leads to better diet quality for preschoolers but not necessarily for school-age children after accounting for the influence of maternal background characteristics, health habits, and household characteristics. *Nutrition information makes a difference.* These results lead to the conclusion that health and nutrition education may be more effective if targeted toward mothers with young children and school-age children.

ERS research suggests that both maternal education and household income have positive effects on maternal nutrition knowledge, consistent with the hypothesis about their role in increasing access to and use of information (Ippolito and Mathios, 1990). Like Thomas, Strauss, and Henriques (1991), ERS finds that after the knowledge-enhancing role of maternal education is taken into account, its direct effect on child diet quality is negative. Conditional on nutrition knowledge, education may be increasing the demand for convenience foods and food-away-from-

home, both have been found to be of lower dietary quality (Lin, Guthrie, and Blaylock, 1996; Lin and Guthrie, 1996).

Mothers' age may capture the effects of learning and experience that remain after controlling for her schooling. Height is a key variable used in many previous studies to control for maternal background effects (Behrman, 1995). Consistent with previous results, ERS finds that maternal age and height are significantly related to higher childrens' diet quality (Barrera, 1990; Haughton and Haughton, 1997; Thomas and Strauss, 1992). However, neither maternal height nor age has information-related effects, suggesting that they capture maternal background and endowment effects that do not influence information acquisition. For example, older mothers may have developed "rules of thumb" about food selection and preparation techniques that translate into healthier diets, holding nutrition knowledge levels constant.

Excepting Haughton and Haughton (1997) in a developing country context, few have studied maternal weight as an explanatory variable. While they found a positive relationship between child nutrition and maternal weight, ERS finds that maternal weight has an inverse relationship with childrens' diet quality through its influence on maternal nutrition knowledge. One explanation is that obesity may be discouraging mothers from investing further in information acquisition and processing. This conclusion is supported by the fact that the adverse influence is greater at higher weight levels. These opposite findings are clearly related to the fact that in developing countries, weight is a positive indicator of health since under consumption of foods and nutrients related to weight is the major problem. In the U.S. and other industrialized countries, overweight or obesity is a negative indicator of health. Therefore, both results confirm the underlying relationship that maternal health endowment is positively related to children's nutritional outcomes.

One key variable overlooked in the children's health and nutrition literature is maternal time preference. Several studies have emphasized that health habits as well as other human capital choices may be affected by an individual's time preference (Farrell and Fuchs, 1982; Grossman and Kaestner, 1995). An individual who places a higher value on current enjoyment may place less value on healthy habits, education, and information acquisition activities compared to those who place a higher value on future enjoyment. In the mother-child context, this means a positive effect of maternal education or maternal health knowledge on child nutrition may be due to a mother's lower time preference which places a higher value on both her and her child's future health. To estimate the 'true' education or information acquisition effect, it is necessary to have a control for maternal time preference. In the ERS study, mothers' smoking status is used as such an indicator (Evans and Montgomery, 1994). Results indicate that maternal smoking has a substantial negative effect on children's diet quality. The sizable effect of maternal smoking status is also not related to information. This poses a challenge to nutrition educators since standard nutrition information programs are not likely to lower the dietary risk of children with smoking mothers. This result also has important policy implications given that earlier studies have found that smoker's own diets are substantially worse than of nonsmokers (McPhillips, Eaton, and Gans, 1994). An earlier study of the diet quality of household main meal planners found that smokers have significantly lower Healthy Eating Index (HEI) scores than nonsmokers (Variyam, Blaylock, Smallwood, and Basiotis, 1998). The present results show that this negative effect is transmitted to children with essentially a similar, if not a higher, magnitude. Therefore, nutrition education

programs need to target smokers, particularly those who are the main meal planners of their household, and alert them to the possible negative influence of their health habits on their children's diets.

In previous studies, children's age and sex have been included to capture possible gender and age discrimination in the allocation of household resources. To the extent that children's diets are under parental control, gender or age differences were not expected in the ERS study and none is found. Among household characteristics, there is a large positive effect for children from households where at least one member is on a vegetarian diet. As the *Dietary Guidelines for Americans* notes, vegetarian diets are consistent with its recommendations and can meet Recommended Dietary Allowances for nutrients. This result and the result for smoking show how strong intra-family effects are generated by the health habits of individual members of the household.

Other household characteristics are generally insignificant, except race, in explaining variation in children's HEI scores. HEI scores for black children are lower than those of other races. Given the potential effect of such higher dietary risk for preschoolers on their future health and schooling, this is a clear indication that nutrition education programs should target black households for special attention.

The effects of nutrition information sources are as expected. Time spent watching television is inversely related to knowledge, possibly because it curtails more information-intensive activities like reading. The effects of receiving dieting advice from a physician or a dietician, and the education level of the male head have positive effects on children's HEI, working through increased knowledge.

Summary

Overall, it appears that the forces of rising incomes, time constraints, time preferences, and moderate food prices are outweighing nutrition and health information. Between 1970 and 1994, the calories available in the food supply rose 15 percent (Putnam and Allshouse, 1997). In 1998, the American Heart Association declared obesity a risk factor for heart disease while citing increased levels of obesity in the United States, from 25 percent in 1976-1980 to 36 percent in 1997. The increase in obese Americans accompanied a decline in the percent of calories from fat: from 40 percent of the diet in 1965 to 34 percent in 1991. Obesity is probably due to greater caloric intake and inactivity (American Heart Association, 1998).

These trends may not be inevitable. Economic studies reveal that consumers' response to changes in income can change in a direction consistent with nutrition information. But even after these changes, increased incomes continued to lead to higher food intakes. A population which is putting itself at risk through eating calls for information strategies that can balance economic forces.

Other evidence reveals improved knowledge over time. On balance, Americans appear to be acting on nutrition information, but offsetting the cumulative effect on their total diets with increased calories and added fats and oils. These two trends reflect both economic forces--

income and a desire to save time--and possibly less recognized calories and fat in processed foods. The economic forces will continue to operate but there is hope that the information effects of increased incomes and schooling will eventually offset their more direct effects. Additionally, time preferences may change. A substantial improvement in overall diet quality could arise, if Americans become convinced that longer term gains in health can become a reality through short-term modifications in eating habits.

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Table 1 -- Sample of Nutrition Knowledge Questions and Mothers responses

Question	Percent of Correct Responses
Which has more fiber?	
<u>Fruit</u> or meat	81.8
<u>Whole-wheat bread</u> or white bread	92.9
<u>Kidney beans</u> or lettuce	53.6
Which has more cholesterol?	
<u>Butter</u> or margarine	83.8
Egg whites or <u>yolks</u>	79.2
Skim milk or <u>whole milk</u>	95.5
Which has more fat?	
<u>Regular hamburger</u> or ground round	86.7
<u>Hot dogs</u> or ham	66.6
<u>Peanuts</u> or popcorn	89.6
Yogurt or <u>sour cream</u>	87.3
<u>Porterhouse steak</u> or round steak	52.3
Which kind of fat (saturated, <u>polyunsaturated</u>) is more likely to be a liquid rather than a solid? Or are they equally likely to be liquids?	26.9
Is cholesterol found in vegetables and vegetable oils, <u>animal products</u> , or all foods containing fat or oil?	35.1

Source: 1989-90 Diet Health Knowledge Survey.

Note: Correct answers are underlined.

Table 1 cont. --Diet-health knowledge questions and percent responses
Children's Nutrient Intakes Study

Question	Percent of "Yes" Responses	
	Age 2-5	Age 6-17
Have you heard about any health problems that might be related to how much:		
Fat a person eats?	70.8	74.0
Saturated fat a person eats?	57.5	61.9
Fiber a person eats?	47.1	51.3
Salt a person eats?	81.5	88.8
Calcium a person eats?	63.6	63.9
Cholesterol a person eats?	85.7	85.9
Sugar a person eats?	80.5	80.9
Iron a person eats?	54.9	52.0
Being overweight?	87.0	90.9
N	308	538

Source: 1989-90 Diet Health Knowledge Survey.

CAN U.S. AGRICULTURE PRODUCE THE BASIC FOODSTUFFS CONSISTENT WITH THE DIETARY GUIDELINES?

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Introduction

Nutritionists at a recent Washington conference argued that Americans eat an unbalanced diet, contributing to numerous health problems (Schneeman).¹ Their position was supported by McNamara, Ranney, Kantor, and Krebs-Smith, who compared an aggregation of US food needs based on the Pyramid Dietary Guidelines to US food supply. McNamara et. al. found substantial deficits in fruit, vegetable (other than potatoes) and dairy consumption. If Americans are to eat a more balanced diet, food supplies will need to adjust to accommodate these nutritional needs, and more of the foods in deficit may need to be produced, while output of other foods could decline. This raises the questions: How would American agriculture cope with providing a better diet, and what forces (on the supply side) may prevent it from doing so now?

The initial purpose of this presentation is to examine the potential of American agricultural production to shift toward providing a healthier diet. As a trade economist, I believe that transition would be dictated by the interaction of production potential with export demand, and by consumer preferences and food processing and distribution firm marketing strategies – more so than by the capacity of American agriculture to fill identified gaps. While trade has not played an important role historically for the products in deficit, they are among the more rapidly growing components of US agricultural trade, and several factors identified here will make it easier for trade to meet any new demands in the future. Thus, if American consumers demand a healthier diet, adjustments will occur in both production and trade patterns.

This issue is explored by first considering the capacity of American agriculture to fill identified gaps, and the extent to which production responds to demand rather than need. Then reasons why trade has historically been less important for food products in deficit, but may become more important, are examined. The size of identified gaps, and the effects on international markets are then considered in the context of studies examining the capacity of world agriculture to meet demand and need. An example of tomato juice trade is then used to show implications of new trade theory for how international markets may in fact respond, and illustrate the importance of firm marketing strategies. Conclusions emphasize the importance of consumer demand driving production and trade outcomes.

U.S. Production Potential

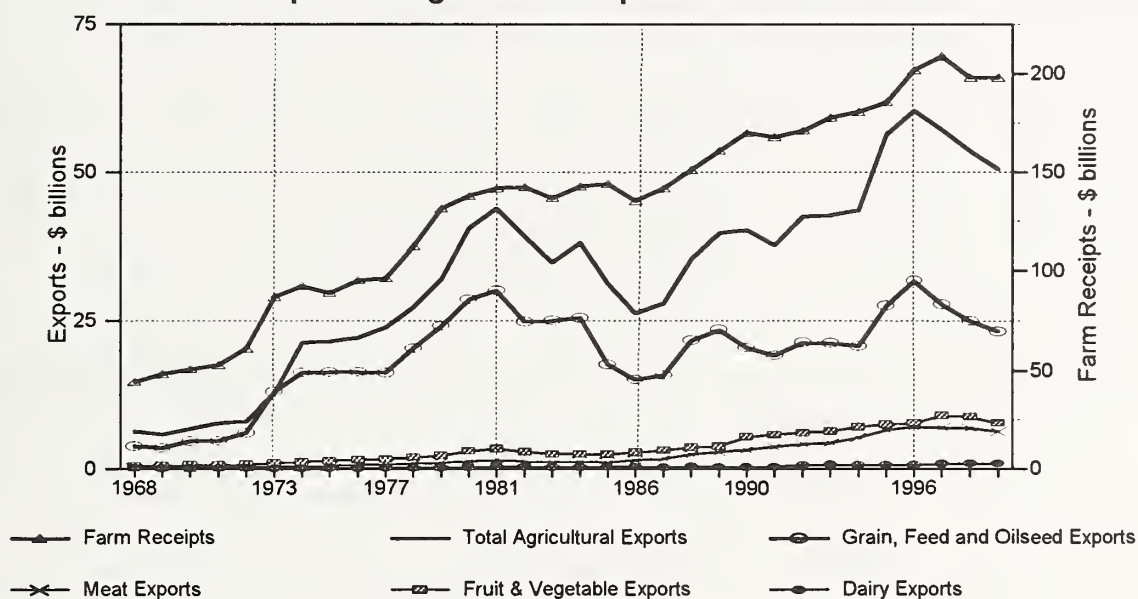
US agricultural production has grown faster than domestic demand over recent years, generating substantial exportable surpluses. US agricultural trade took off following the price spikes of the

1973 world food crisis, and US agricultural production followed that demand trend. When in 1981 export demand growth stalled, production growth slowed, but evidence of surplus capacity emerged. In 1986 export demand growth resumed, along with output growth.

These trends are shown in Figure 1, along with some detail on the composition of US agricultural trade growth. They show volatility in trade of grains, feeds and oilseeds leading to observed variations in farm income and output trends. Trade in meats, fruits and vegetables has been steadily increasing since 1986, having been quite small before then. These data and the market history behind them are intended to support the claim that demand (in this case exports) induces supply growth in these markets, and that when demand is growing production catches up.

Figure 1.

Farm Receipts and Agricultural Exports



Behind these trends, though not shown in these graphs, are price trends which reinforce this story, and reinforce as well the belief that agriculture is one sector of the economy where price incentives are critical to production trends. For increased output in fruit, vegetable and dairy sectors, farmers will need to realize higher prices and profits. If price signals indicate that the demand for more of certain agricultural products exists, production patterns will follow. Hence, most economists at the Dietary Guidelines conference saw production potential as a non-issue in this debate. The key concern was whether consumer demand will call for healthier foods.

Two participants at the Washington conference with closer ties to production agriculture also argued, from their different perspectives, that American agriculture could meet demands placed on it, and would better serve nutritional needs if demand patterns better reflected those needs. Zilberman noted that the concern to be examined is whether resources used in agriculture are adequate, and can shift, to meet differing production patterns. His answer was yes, and he explicitly observed that irrigated areas in California can shift to higher value crops to

accommodate nutritional need. Duxbury and Welch offered a similar perspective from two agronomists, noting that most regions in the US were far more self-sufficient in fruit and vegetable production in the past, and could be again if incentives permitted them to profitably do so. The market has at this point permitted California's dominance in these products, and has determined the observed, specialized production and trade patterns.

Each of these perspectives suggests that the resource capacity exists to meet consumption patterns more closely related to nutritional need. Moreover, it is argued here that capacity will not be heavily taxed if Americans do demand a better diet, as adjustments will depend more on how international trade interacts with demand to meet need.

Role of Trade in US Food Supply

International trade and agricultural production overseas have historically played only a small role in meeting U.S. food needs, especially for fruits, vegetables and dairy products. Table 1. demonstrates this point while at the same time reporting the extent of food gaps by product group. It shows the considerable surpluses generated by American agriculture for grains, and that for most other products self-sufficiency ratios are near or above 100%. For grains, international trade has at times been viewed as a residual demand component utilizing excess U.S. production capacity. Market characteristics are quite different for the other products, where in spite of self-sufficiency there are often imports, which are in a few cases substantial. Explaining this requires that we note the existence of substantial two-way trade (exports and imports coexisting), a phenomenon inconsistent with all but the most modern theories behind why trade patterns are what they are (Ethier). For fruits, vegetables and dairy products, seasonality in production and demand for variety account in part for these trade flows, and raise issues of product differentiation (read marketing strategy) to explain why trade occurs as it does.

The capacity of international markets to supply products in deficit coupled with recent, accelerating trends in trade in those commodities points to the enormous potential for trade to contribute to filling any US food supply gaps. Rapid growth in the last 15 years for products in deficit raise the question why did the US not rely in trade in these products earlier, and what has changed to encourage both imports and exports of these products?

Why trade has been unimportant as a source of US supplies?

Several reasons explain the earlier trade patterns, and low trade levels for fruits vegetables and dairy products. Most countries, including the U.S., have been largely self-sufficient, especially in vegetables and dairy. This has been determined by policy decisions and transportation costs limiting international flows of these products.

Perish ability and quality losses make transportation costly. This is true of agricultural goods relative to industrial goods, accounting in part of greater self-sufficiency in agricultural trade, and is especially true of fruits, vegetables and dairy. Where transportation is less costly -- for grains and oilseeds -- the share of product traded is generally much higher. In the past for some products, when there was trade it was largely in a highly processed form, such as for non-fat dry milk, which was much easier to transport.

Table 1. Contribution of International Trade Toward Filling the US Food Supply Gap

US	Food Supply Gap	Self - Sufficiency	Import Contribution
Grains	10.5%	335.0%	27.7%
Vegetables		101.6%	8.9%
Potatoes	-47.9%	101.6%	6.3%
Others	31.0%	101.7%	11.7%
Fruit		81.9%	39.0%
Citrus	68.8%	91.8%	29.9%
Other fruit	64.3%	75.1%	45.2%
Dairy	46.8%	95.6%	6.4%
Meat	14.5%	103.5%	4.8%
Poultry	14.5%	113.8%	0.0%
Fish	15.4%	74.1%	53.4%
Eggs	13.6%	100.0%	0.0%

Food Supply Gap is (Dietary Requirements/Food Supply) - 1, expressed in %

Self-sufficiency equals 1-(Net Imports / Food Supply), expressed in %

Import Contribution is (Gross) Imports/ Food Supply, expressed in %

Sources: McNamara, Ranney, Kantor and Krebs-Smith (1998) for US Food Supply Gap and Abbott (1998) for for calculations using the FAO (1998) Agrostat Database Collection.

Agricultural policy has a producer bias, especially in the US for these products. That policy has raised prices to protect farmer incomes, and may have discouraged to a limited extent consumption. With large marketing margins and low price and income elasticities for these products, the demand effects of policy are likely to be small, while domestic supplies may well have been increased due to protection (Kinsey). Trade policy has reinforced producer support. Import quotas on dairy remain today, while non-tariff barriers for fruits and vegetables (grades and standards applied to imports) have been used to limit imports as well as meet food safety requirements. Moreover, U.S. agricultural trade policy has promoted exports to dispose of surplus production. The dairy export incentive program (DEIP) continues to subsidize exports even after the 1994 GATT agreement. GSM -102 credit guarantees are used to help exporters of most agricultural commodities. The Foreign Agricultural Service (FAS) acts as an export promotion entity, as viewing their web page will quickly show.

The combination of costly transportation and protection of domestic agricultural producers at one point limited trade, but changes in these and other factors have recently encouraged much more trade in higher value agricultural goods.

Why trade may play a greater role in the future?

Fruits and vegetables are among the most rapidly growing agricultural imports, as shown in Figure 2. In addition, exports of these products are growing rapidly as well, with growth taking off around 1986. Lack of dynamics in dairy trade until 1995 reflect import quotas which fix trade levels, and which were finally relaxed as part of the 1994 Uruguay Round Agreement. Trends in high value and processed food trade have been recognized for quite a while, and several reasons have been put forward to explain these trends (Henderson, Handy and Neff).

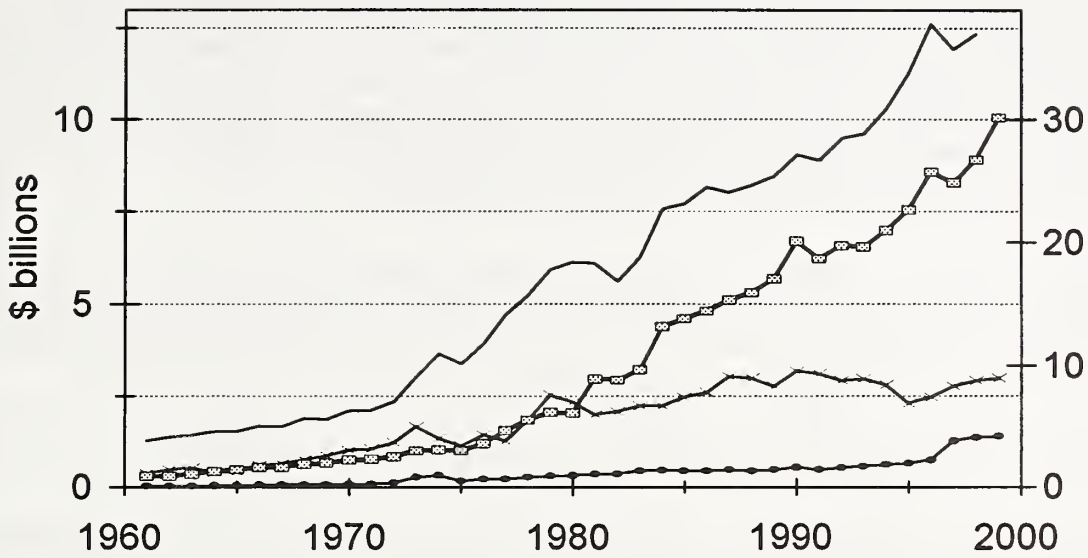
Improvements in transportation have been important to these trends (Trypus). Containerization has greatly facilitated shipment of perishable commodities, and smaller lots of goods. Accurate climate control inside containers preserves quality and shelf life of foods, enabling shipments via less expensive sea freight of goods which previously had to use expensive air freight. Regularly scheduled shipping and modern port handling equipment have improved logistics greatly. Processing has been used to facilitate transportation, as well, and technical change has found better ways of processing perishable goods for transport and storage. Information now moves more easily, as well. Each of these has lowered the cost of transportation, especially for higher value and processed agricultural products.

Numerous agricultural policy reforms have reduced (if not eliminated) the producer bias of agricultural policy. Policy reforms in 1992 and 1996 Farm bills decoupled producer income support from prices, taking away disincentives to consumption and incentives to overproduce (Stovall and Hathaway; Young and Wescott). This was reinforced by the US position and its offer in the 1994 Uruguay Round GATT Agreement, which also emphasized decoupling of producer support from price incentives and reduction of export subsidies. Dairy price supports are being phased out by 1999, and dairy export subsidies are to decline, while new export subsidies for the other products are not permitted. Another initiative of the World Trade Organization, the international entity created to administer the GATT agreement, is to establish harmonized grades, standards and rules governing agricultural trade, and basing those standards more on scientific principles (Roberts). Thus, these regulations will be less likely to be used as protectionist devices limiting fruit and vegetable trade, and more as devices to preserve food safety (Unnevehr, Kramer and Deaton). A similar initiative succeeded in NAFTA, reducing non-tariff barriers in agricultural trade with Canada and Mexico (Raney and Shagam).

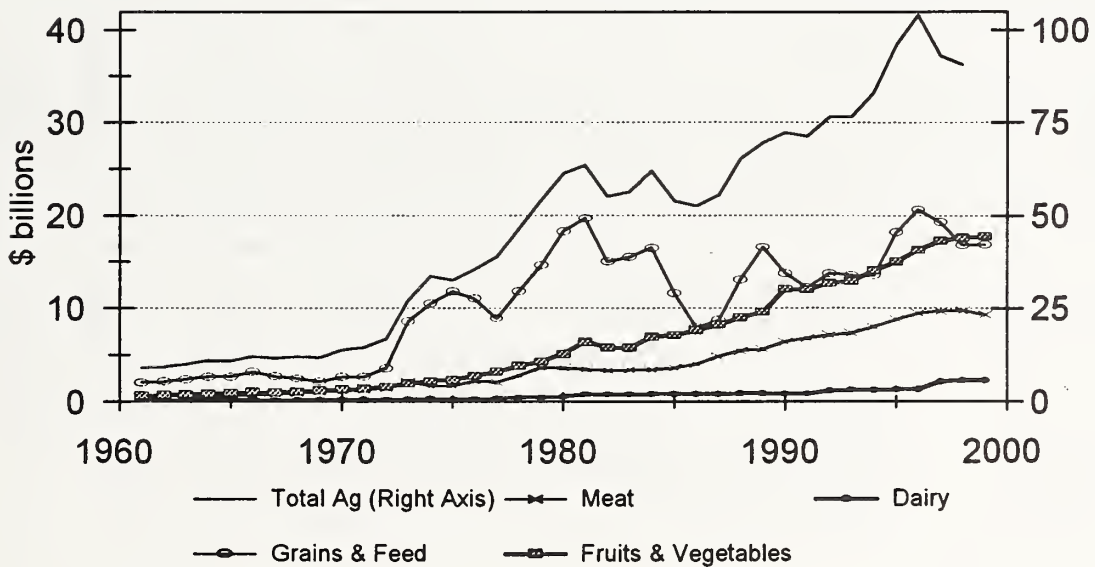
While certainly there have been other reasons behind the growth in high value and processed food trade, including greater ease in sharing market information internationally, the reforms of policy and technical improvements of transportation have reduced principle factors limiting trade in fruits, vegetables and dairy products. Recent trends have already shown consequences of these changes.

Figure 2. US Agricultural Trade Composition.

US Agricultural Imports



Total US Agricultural Trade (Exports + Imports)



Source: Economic Research Service data.

Potential for increased exports

Another reason why trade is likely to be critical to the evolution of American agriculture, should dietary preferences change, is that there now exist a number of exporting countries with the potential to supply the US market who are aggressively seeking larger market shares. Table 2 shows that countries in Latin America and the Mediterranean often have producer prices for fruits and vegetables at or below levels found in the US. This can be used a crude test of comparative advantage -- where producer prices and hence production costs are lower, freer trade should allow these countries to expand exports. Those countries with producer prices below or near US levels may well be able to cost effectively sell to the US market.

Several of these countries, especially in the Mediterranean, had advantageous entry into the European Union due to Lome Convention concessions which were lost following the recent GATT agreement. As exporters (similar to the US), their policy has also encouraged surpluses, and exports now more than before are needed to dispose of those surpluses.

Will Improving US Diets Create Problems for Food Supplies Elsewhere?

Table 1 is reproduced below as Table 3 using data for world supply and utilization of agricultural commodities. The world food gaps are found simply by scaling the U.S. food requirements upward by the ratio of world population to US population. This exercise shows much greater world food supply gaps, and deficits for most commodities, than in the US case. This suggests larger, though different, nutritional problems outside the US, and begs the question whether using trade to improve US nutritional standing will make the rest of the world worse off. This exercise also provides an opportunity to consider the capacity of world agriculture to meet increased demand.

Three caveats must be borne in mind before addressing the adequacy of world food supplies to meet these nutritional requirements. First, the dominant policy concern over most of the last three decades has been surplus disposal, not inadequacy of supply. Only twice have capacity concerns risen to the head of the debate -- during the 1973 world food crisis and with the price run-up in 1995-96 -- and in each case those concerns received less attention once surpluses reemerged. Second, nutritional standards may reflect high U.S. calorie consumption, cultural biases, and lack of balance in US diets rather than nutritional deficiencies -- especially in the case of meat. Thus, world food gaps reported here may well overstate the problem. Third, nutritional need does not determine demand. Effective demand occurs when consumers need something and have the income to choose it. In spite of poverty and malnutrition, effective demand for food has often been inadequate to maintain prices of agricultural commodities, and so does not provide incentives for increased production. Rather, surpluses have emerged as production has outstripped effective consumer demand.

Table 2. Vegetable, Fruit and Dairy Producer Prices in 1994 Relative to U.S. Producer Prices

Country	CABBAGE	TOMATO	PEPPERS	GR BEAN	CARROT	ORANGE	APPLE	PEACH	GRAPE	MELON	MILK
USA	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
CANADA	<i>0.77</i>	<i>0.88</i>	1.06	<i>0.48</i>	<i>0.58</i>	1.00	1.06	1.69	1.04	<i>0.66</i>	1.41
Latin America											
MEXICO	<i>0.53</i>	1.34	0.99	<i>0.43</i>	<i>0.62</i>	<i>0.39</i>	<i>0.89</i>	1.60	<i>0.63</i>	<i>0.54</i>	0.68
CHILE	<i>0.87</i>	2.13	<i>0.71</i>	<i>0.71</i>	<i>0.64</i>	1.25	<i>0.57</i>	<i>0.75</i>	<i>0.87</i>	0.93	0.79
North Africa & Middle East											
ISRAEL	0.97	1.27	<i>0.76</i>	<i>0.44</i>	0.96	0.98	2.58	1.92	1.34	1.11	0.88
MOROCCO		0.95		<i>0.46</i>	0.99	1.72	3.01	1.56	1.38	1.09	1.10
TUNISIA	0.91	<i>0.71</i>	<i>0.86</i>	<i>0.61</i>	<i>0.67</i>	2.03	1.77	1.91	1.04	0.87	1.11
EGYPT	<i>0.26</i>	0.44	<i>0.23</i>	<i>0.14</i>	<i>0.17</i>	0.99	<i>0.73</i>	<i>0.65</i>	<i>0.53</i>	0.41	1.13
Europe											
SPAIN	1.19	2.03	1.29	1.71	<i>0.81</i>	1.43	1.08	1.67	1.57	1.10	1.16
NETHERLANDS	2.77	8.49	3.64	1.12	1.61		3.27	9.06	11.64	5.30	2.00
FRANCE	0.91	5.70	1.58	3.05	1.32	3.52	2.00	3.71	4.26	3.75	1.25
Asia											
JAPAN	3.86	16.53	4.85	6.90	6.50	12.80	8.01	13.67	25.03	11.17	3.00
CHINA	<i>0.17</i>	<i>0.31</i>	<i>0.10</i>	<i>0.17</i>	<i>0.23</i>	1.09	<i>0.80</i>	<i>0.61</i>	<i>0.71</i>	<i>0.23</i>	0.47
INDONESIA	<i>0.44</i>	<i>0.89</i>	1.68	<i>0.21</i>	<i>0.62</i>	4.74					0.90
THAILAND	<i>0.87</i>	1.70		<i>0.47</i>		4.02			2.83		1.11
NEW ZEALAND						8.20	1.34	3.07	1.22		0.67

Entries are local producer prices, converted to US dollars, and divided by US producer prices.

Sources: FAO (1998), Agrostat Database Collection, for producer prices in local currency

IMF (1997), International Financial Statistics, for exchange rates.

Table 3. Contribution of International Trade Toward Filling the World Food Supply Gap

World	Food Supply Gap	Self - Sufficiency	Import Contribution
Grains	-19.2%	72.7%	27.3%
Vegetables		93.5%	6.5%
Potatoes	-19.2%	90.6%	9.4%
Others	-19.2%	95.0%	5.0%
Fruit		79.9%	20.1%
Citrus	-19.2%	66.3%	33.7%
Other fruit	-19.2%	83.5%	16.5%
Dairy	-19.2%	84.9%	15.1%
Meat	-19.2%	90.8%	9.2%
Poultry	-19.2%	91.4%	8.6%
Fish	-19.2%	50.8%	49.2%
Eggs	-19.2%	97.5%	2.5%

Food Supply Gap is (Dietary Requirements/Food Supply) - 1, expressed in %

Self-sufficiency equals 1-(Net Imports / Food Supply), expressed in %

Import Contribution is (Gross) Imports/ Food Supply, expressed in %

World Food Supply Gap is based on US dietary requirements and World to US Population

Sources: McNamara, Ranney, Kantor and Krebs-Smith (1998) for US Food Supply Gap and Abbott (1998) for for calculations using the FAO (1998) Agrostat Database Collection.

While studies have not focused specifically on the world's capacity to produce the foods in deficit in the US diet, several studies have examined the overall capacity of world agriculture to feed an increasing population. While extreme claims exist, the studies by USDA, FAO, the World Bank, and in the International Food Policy Research Institute's Vision 20/20 project can all be classified as cautiously optimistic (WAOB; Alexandratos; Mitchell and Ingco; Islam). They suggest that world agriculture can keep up with demand, provided that sufficient investments, including efforts in research and development, are made. They do raise the concern that the surplus mentality which has persisted since 1986, along with the low prices which accompanied it, have discouraged investments, especially in research, accounting for slowing in agricultural production relative to population. Price incentives are seen as key to insuring adequate incentives to farmers and agribusiness, and to insuring sufficient food supplies in the future.

Another factor relevant to this paper's objectives is that US imports, and its food supply gaps, are only a small fraction of worldwide supplies. Increased imports would not unduly strain the production capacity of the world to meet increased demand, though prices would need to rise to redirect product to our market.

Lessons from the 1973 food crisis, and from famine management support a similar position (Islam and Thomas). As noted above, the coexistence of famine and food surpluses is explained by the importance of effective demand, not supply capacity, in determining what people eat. Increasing supply capacity but not demand will only add disincentives to future production growth. As in the other arguments here, demand levels are key to the evolution of markets and their ability to provide healthier diets.

How world food markets now function - Implications of Two- way trade

An important characteristic of the rapidly growing vegetable, fruit and dairy trade is that it is two-way -- imports and exports coexist. Why this occurs, and its implications for future trade outcomes, is best seen by an example.

Tomato juice served on Royal Air Maroc, the state owned airline of Morocco, on flights to France, is processed in California from tomatoes grown there. Several aspects of this "trade flow" make it remarkable. First, tomatoes have been historically exported from Morocco to France, but Spain's position in the EU, and recent policy reforms required under GATT have given the advantage to Spain in the French market. A long standing policy dispute continues over Moroccan access to the EU as a result, since France has remained Morocco's primary export destination, and it has experienced only limited success in penetrating other EU markets. In spite of this dispute, Morocco is "exporting" tomatoes to France as juice in this example, but with tomatoes which are not of Moroccan origin. This, in turn, is in spite of the Moroccan efforts, to some extent successful, to sell processed tomato products in the US market. This effective "US export" is of a product in which we are experiencing a nutritional deficit according to the food gap analysis, while some of the good (tomatoes) is being imported.

Several lessons are apparent from this example, especially if one considers why the US tomato juice processor may have succeeded in this market. First, tomato juice is not a common product in either French or Moroccan diets - the product is an innovation. Second, for the airline, the convenience provided by the packaging (the can) is of greater importance, and may well have cost more than the tomatoes inside. The processor was marketing a differentiated product (juice), and importantly, service embodied with the product (the can, and timely deliveries to the airline). Successful marketing by the processor enabled the US to profitably export a product where a food gap existed. Processing, including packaging to facilitate transportation, both differentiated and increased the value of that export, and facilitated transportation. The driving force for this transaction was the "consumer" demand by the airline -- not only for tomatoes, but also for a particular product and service -- and the marketing strategy of the juice processor, who succeeded in the face of an opposing policy environment and an apparent comparative disadvantage.

This example of a US firm targeting an exporting country as a market for a differentiated product, resulting in profitable two-way trade, is a concrete example of New Trade Theory, and goes a

ways toward explaining the differing perspectives of comparative advantage and competitiveness.

Competitiveness and Two way Trade

According to the theory of comparative advantage, low cost producers will export those products where costs and prices in the absence of trade (autarky) and below free trade world prices. Factor endowments and technical differences can bestow this comparative advantage on a country. Several characteristics of modern trade patterns contradict the predictions and implications of this theory (Either), and may enable a seemingly higher cost producer to win in a market. Two-way trade is one important contradiction. I view the important difference between comparative advantage and competitiveness as arising as a consequence of the elements found critical to the New Trade Theory, and which explain these contradictions - economies of scale, product differentiation, and imperfect competition (Abbott, 1998).

In the above example, product differentiation is a key factor determining success of an exporter strategy, and leading to observed trade flows. Marketing and distribution are seen, especially for higher value agricultural products, as important to determining profitable trade outcomes. Transactions costs (transportation and marketing margins) and institutions (airline food service as the source of demand) are as critical to how markets will evolve. Food manufacturers will respond to consumer demand in the context of these constraints and opportunities. Better diets will be provided only if consumer preferences make providing healthier diets one of the driving forces behind those opportunities.

Conclusions

Consumer demand, not production potential, is key to how food markets will evolve and whether there are improvements in U.S. diets. In virtually all of the perspectives presented above, it was seen that demand trends drive production, not vice versa. Consumer preferences and education will determine that demand. Supply adjustments may not be immediate, and price increase will lead supply adjustments, but production in both the U.S. and abroad can accommodate the needs projected in U.S. food supply gaps. International trade will determine how adjustments occur, even for the key products in deficit - vegetables, fruits and dairy.

Transportation system improvements and policy reform will make contribution of international trade toward this goal easier than in past. Technical improvements in international shipments of food products have reduced costs and logistical barriers to trade in the key products identified here. Policy reforms in the 1991 and 1996 farm bills, and in the 1994 GATT Agreement as well as NAFTA, have reduced the producer biases of agricultural policy which worked against trade contributing to food supplies in these cases. Rapidly increasing processed food and higher value agricultural product trade indicate this change agricultural trade composition is already underway.

US agricultural production, food manufacturers, and international trade can provide the variety and service consumers demand. Price incentives and marketing strategy of processors and distributors matter to what portion of increased demand may be seen by American farmers, and whether healthier diets will in fact arise in the future. Policy is at greater risk of being a deterrent to, rather than a stimulus to this process, which will be largely market determined.

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Endnotes

1. The Proceedings of the conference "Toward Convergence on the Dietary Guidelines: Research and Policy Needs" sponsored by the Economic Research Service of USDA, the National Cancer Institute, the Farm Foundation and Cornell University, held on October 13 -14, 1998 in Washington, DC. Will appear in the April 1999 issue of Food Policy. See Abbott as well as several other cited papers for a fuller discussion of issues raised here.

USDA
Agricultural Outlook Forum 1999

Session 8

Agricultural Risk Management Tools for the Future

The Crystal Gateway Marriott Hotel

Crystal City, Virginia

February 22, 1999

FARMERS and DERIVATIVES

A SUCCESSFUL COMBINATION in the 21st CENTURY

A Presentation by Joseph B. Dial

Consultant

Managing the "Elecular Revolution"

INTRODUCTION

I am honored to be a speaker at the 1999 USDA Outlook Forum. My presence here today is actually a return engagement in as much as while I was a Commissioner at the Commodity Futures Trading Commission (CFTC) I had the good fortune to address the Forum in 1997. In my opinion this event, throughout its 75- year history, has always been one of the most prestigious conferences on current agricultural issues anywhere in the world.

The title of my presentation today is "Farmers and Derivatives - A Successful Combination in the 21st Century." I know a little something about farmers because I was actively engaged in agricultural production for nearly forty years. And for the last eight years I have been right in the middle of the use of derivatives, first as a Commissioner of CFTC and now as a consultant to foreign governments that want to permit the use of exchange-traded futures/options in their respective countries. So I would be the first to admit that derivatives are probably at the bottom of most farmers' list of business management tools. Why then, you might ask, do I think that in the 21st century farmers and derivatives are going to be a successful combination?

I am going to explain my rationale in five parts. First, I will provide a brief description of a derivative. Second, I am going to talk about 20th century farmers and their attitude

toward managing yield and price risks. In parts three and four, I'll cover two trends I believe will totally change agriculture as we know it today. In the final section I will briefly examine one type of derivatives I believe will be an important part of new age risk management techniques.

DERIVATIVE

I recognize the term derivative is not a household word, so I will make the definition as simple as possible. A derivative is a contract that involves the trading of rights or obligations based on an underlying product, without necessarily directly transferring that underlying product. The derivative instruments you are probably most familiar with are exchange-traded futures and options. Other derivatives are negotiated between counterparties in the over-the-counter (OTC) market, usually with the help of an intermediary. OTC derivatives come in a variety of forms, including swaps, hybrid instruments, energy forward contracts and trade options. Derivatives are used by a hedger to transfer the risk of an unacceptable change in the price of the underlying product to a speculator who is willing to accept that risk in anticipation of a favorable return on his/her capital investment.

Farmers' Attitudes about Managing Yield and Price Risk

Farm Futures magazine did a survey of 960 farmers last year and found that about five percent of them "are using available tools to manage production and financial risks." Some of the leading professors who teach risk management in land grant universities and many farm management Extension personnel tell me they think the number is closer to ten percent.

In his article entitled "Crop Deregulation is put to the Test in New Rural Crisis," Wall Street Journal reporter Scott Kilman had this to say about farmers and their attitude toward risk management. He quotes Dorothy Gilbert, manager of the family-owned elevator in Keosauqua, Iowa as saying, "They [local farmers] sell just when they need money. That's not smart." Ms. Gilbert had talked to her customers about derivatives, i.e., options on futures, which would have allowed them to lock in a profit early in the growing season. Only one farmer pulled the trigger, followed her advice and bought options. That anecdotal evidence lowers the percentage to something less than one in one hundred farmers in that community.

The Farm Futures magazine survey, the experience of those academics who are on the front line of teaching risk management to producers and the refusal to use derivatives by a high percentage of farmers in Keosauqua, Iowa all raise an interesting question. Why don't more producers manage their yield and price risks? There are of course a number of reasons. The one I believe should be at the top of the list is the fact that the government managed the "lion's share" of growers production and price risks for 60 years. As a result there was no need for farmers to develop the skill set necessary to manage these risks themselves. Lacking the training and experience necessary to

make prudent decisions about managing their production and price risks, most farmers do nothing to minimize such risks.

To their credit a small number of growers have learned how to analyze and manage their business risks since passage of the Federal Agricultural Improvement and Reform Act (FAIR Act). However, the President signed the FAIR Act nearly three years ago. And a majority of producers still don't realize that risk management is an absolute necessity when one farms for the market and not the government.

This fact is painfully clear when you read the headlines in the press concerning the emotional and financial trauma many farmers are experiencing because of devastating declines in prices for many agricultural commodities. For example, when compared to 1997 we find that 1998 prices declined as follows: corn, 27 percent; soybeans, 13 percent; wheat 29 percent; beef 20 percent; and a 50 year low for hogs.¹ The unfortunate result for many producers who had no downside price protection in the face of such low, low prices was captured in the headlines of a recent USA Today cover story, "Farms fold under price crunch."

At this time it is difficult to imagine that anything good could possibly come out of such a sad scenario. Nonetheless, let us hope that 1998 will serve as a wake up call to farmers to get serious about managing their production and price risks. If not perhaps one more "reality check" concerning commodity prices in the future will convince them. The World Bank's first Global Commodity Markets report forecasts that in real terms, prices for commodities will be lower in 2010 than they were in 1997.

You have heard the old saying that when the going gets tough, the tough get going. I believe farmers are a classic example of this adage. They are the epitome of the American tradition of over coming adversity by finding innovative solutions to challenges. And there is a confluence of trends taking place as we speak that will assist them in finding the risk management tools that fit their individual needs. Tools they understand and will be comfortable in using.

As I explain these trends and the farmer friendly risk management tools that are growing out of them you will understand why I believe farmers and derivatives will be a successful combination in the 21st century.

¹ Andrew Osterland, "Agriculture, Prognosis 1999," Business Week, 4 February 1999, 28.

THE "ELECULAR" REVOLUTION (ELECTRONIC/MOLECULAR)

The first trend I am going to talk about is the "Elecular" Revolution (Figure 1). You won't find the word "elecular" in the dictionary. It is a term I coined to refer to the awesome technological power that mankind has at its disposal upon combining the unlimited potential of electronic technology and molecular science.

The business world is responding to the Elecular Revolution in many ways, but one of the more visible responses is the emergence of the "life science" industry. For example, since 1995, Monsanto has changed its primary business from chemicals to crop biotechnology. Over the past three years, it has transformed itself by investing \$8 billion in seed companies like DeKalb Genetics, Asgrow, Calgene, Cargill's foreign seed operations and the European wheat seed breeding business of Unilever. Some time ago the Wall Street Journal carried an article by Scott Kilman in which he wrote, "Biotechnology is making plant breeders hot properties. Monsanto needs to control seed companies in order to get its genetically-engineered traits in the hands of farmers."

DuPont, another of the Fortune 500's most respected companies has its eye on crop biotechnology too. For example, in 1997, there was an estimated one million acres planted with the high-oil corn seed developed by Pioneer and marketed by Optimum - - a joint venture company formed by Pioneer and DuPont. By 1998, plantings in the US of high-oil corn seed had doubled to approximately two million acres.

I believe this two million acres is only the tip of the iceberg in terms of the total number of acres that will be planted in genetically modified organisms (GMOs) in the next century. After all, at the end of 1997 the worldwide total was close to 30 million acres.² The reason why more and more farmers will plant GMOs in the future is because there will be a revenue assurance provision written in the contract between the farmer and the seed company. Not only that but the contract will also include a firm price on the inputs the farmer will use and provide the financing to pay for them. Today there are companies that offer various combinations of the GMO seed, inputs and financing, however, I am aware of only one that has included a revenue assurance provision too.

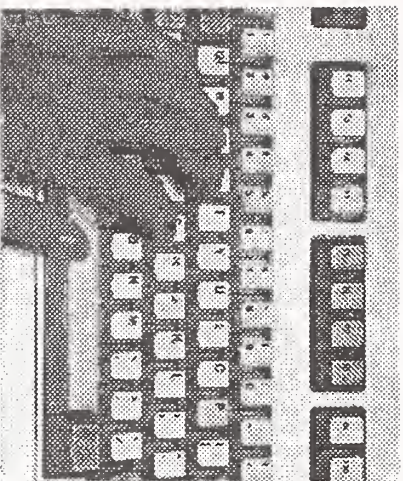
The business process I have just described sounds simple. Believe me it isn't. It is a complex maze of matching seed sales with identity preserved grain storage; salesmen with farmers' orders for seed and input supplies and the contract they have written and signed. And then tracking the movement of the value added grain from the farmer to the elevator to the domestic or foreign end user. This process is a prime example of the Elecular Revolution at work, a fusion of electronic technology and molecular science.

² Alison Maintland, Financial Times, 9 January 1998

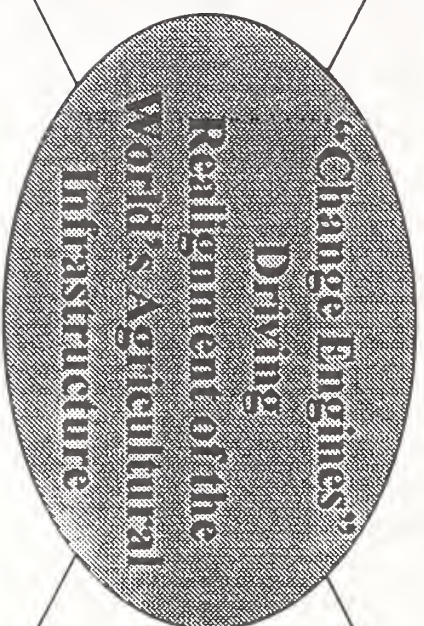
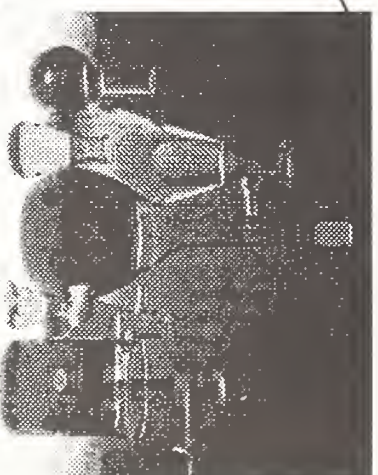
The “Elecular” Revolution of the 21st Century

The awesome technological power that mankind has at its disposal upon combining the unlimited potential of electronic commerce and molecular science

Electronic Commerce



Molecular Science



Life Science Industry

Monsanto

DuPont/Pioneer

Optimum

To give you a sense of the electronic side of managing all this data, here is a diagram (Figure 2) of how E-Markets of Ames, Iowa makes it happen. NetMarket is just one of many Internet based software applications developed by E-Markets as they connect agribusiness and the food industry. Their Internet address is www.e-markets.com. There may be other companies doing similar applications that I am not aware of. I am familiar with E-Markets because I do consulting work for them.

On the one hand there is nothing new as to the players and the business transactions by and between them in the diagram I just showed you. What is different is the fact that the Internet and GMOs are the change engines that make it happen in the innovative way it does. These same tools are the genesis of the "Evolution of Creative 21st Century Business Models for Agriculture." And I believe one of those models will be the "virtually integrated" enterprise.

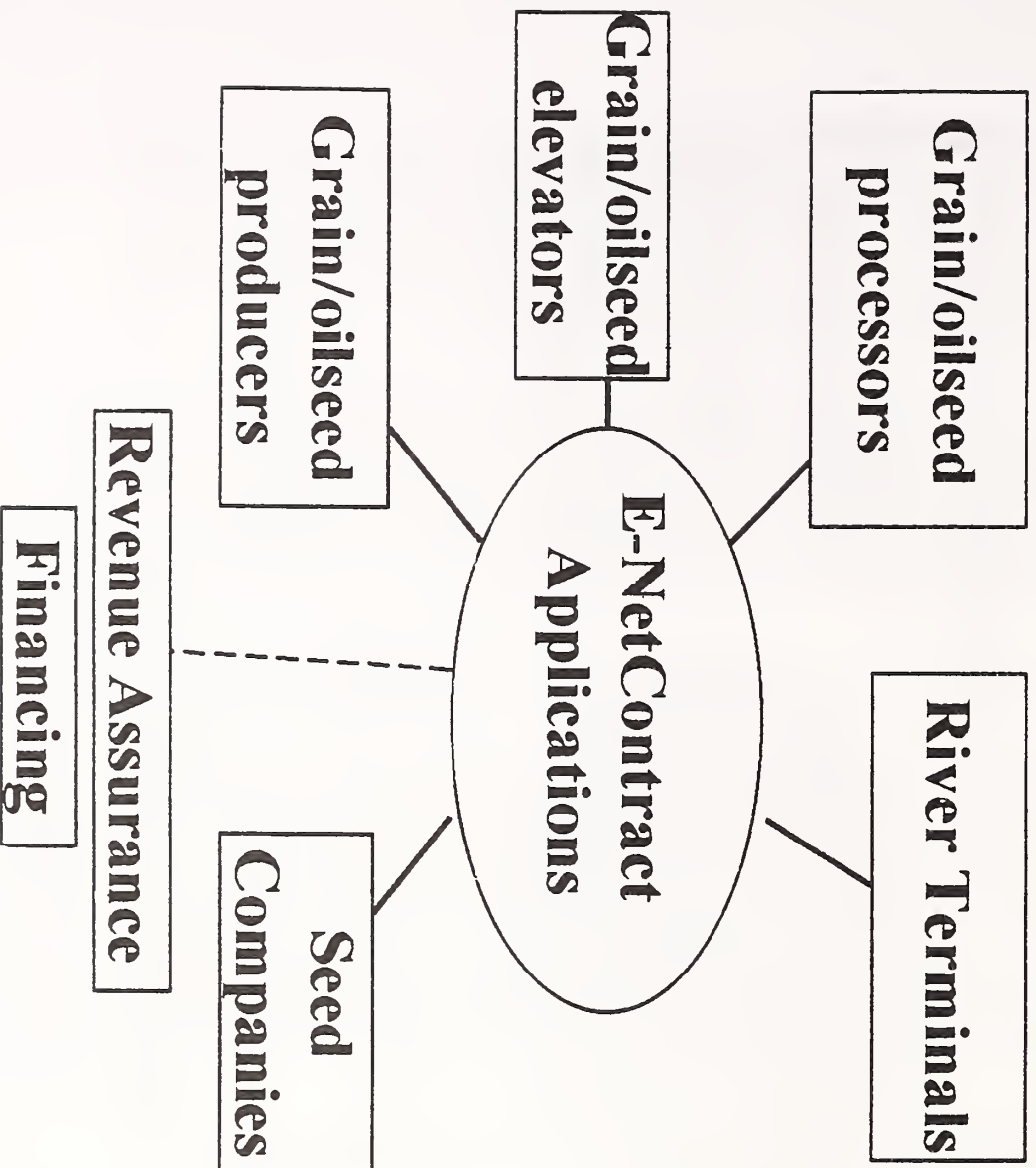
The Evolution of Creative 21st Century Business Models for Agriculture

My vision of the "virtually integrated" business model for agriculture (Figure 3) would bring together independent enterprises, the technology providers, like E-Markets and the Seed Company, input suppliers, growers, merchandisers, processors, wholesalers/retailers and the consumer. The tie that would bind them would be an Internet based electronic agricultural information system with functional E-Commerce modules. A neutral third party would provide the software and hardware as well as professionally manage the continuous operation of this system. An important element in such a system would be one that provided farmers some risk management tools they don't have available to them now - - more about that in a moment.

In a "virtually integrated" enterprise there would be no centrally managed and controlled hierarchy with bureaucratic turf battles. On the contrary, the "virtually integrated" model would allow each player to retain its autonomy, independence, and ability to adapt quickly to new market demands and advanced technology. Another characteristic of the virtually integrated business model would be an absence of the traditional "I win - you lose" gamesmanship between buyers and sellers in the agricultural sector. In its place you will see a "demand driven" economic chain with the consumer in the drivers seat. I believe the "virtually integrated" arrangement will become one of the dominant business practices in agriculture in the new millenium.

There are two reasons why I believe that will happen. The first one I have already mentioned - - the "Elecular" Revolution. The "virtually integrated" model lends itself to accommodating the management demands of the "life sciences" industry. Second, in order to be competitive in the 21st century global economy, US agriculture needs to practice "costing the entire economic chain." Economist Alfred Marshall wrote about it in the 1890s and Peter Drucker had this to say about it in the 1990s, "managing the economic cost chain will become a necessity. Indeed, executives need to organize and manage not only the cost chain but also every thing else - as one economic whole,

E-Markets NetContract



Features:

- Contract origination
- Quality data management
- Grain delivery management

Current participants

- DuPont
- Pioneer Hi-Bred
- Continental Grain
- Cargill Seed
- >400 local elevators
- >100 seed companies
- >6,000 Users

Implementations:

- OSCAR

Internet Address:

- www.e-markets.com

regardless of the legal boundaries of individual companies."³ Peter Drucker is considered by many to be the "most important management thinker of our time."⁴

One of the most daunting challenges to "costing the entire economic chain" in agriculture is the development of risk management tools farmers will use because they understand them. And they know and trust the companies that stand behind these tools. That brings me to the final section of my presentation.

AGRICULTURAL TRADE OPTIONS

An Agricultural Trade Option (ATO) is a contract between two entities that are commercially involved in certain enumerated agricultural commodities. The Commodity Futures Trading Commission (CFTC) recognizes these entities might be a farmer, a livestock or poultry feeder, an elevator, a processor or a merchant handling grain. The contract gives one party the right, but not the obligation to deliver an agricultural commodity to the counter party. If delivery takes place the buyer pays the seller the strike price that was agreed upon by the parties at the time the option was written. In return for this price guarantee the seller of the commodity paid the buyer a premium when the option was originally entered into. Call it a price insurance policy if you like.

Although it took me four years to get the CFTC to lift its ban on Agricultural Trade Options (ATOs), I was finally successful in achieving that goal some two weeks before my term as a Commissioner was up in November of 1997. Then about six months after I left the CFTC to become a Fellow at the Institute of Politics, John F. Kennedy School of Government, at Harvard University, the agency published its Interim Final Rules on ATOs. I was disappointed in the regulatory structure laid out in the Interim Final Rules because in my opinion it is too restrictive. Apparently others in the agricultural sector feel the same way because no one has registered to become an Agricultural Trade Option Merchant (ATOM). As a result ATOs are not being used. I believe this will change as the grain trade industry, producer associations and the CFTC work together to amend the Interim Final Rules. When that happens here are some examples of ATOs that will be farmer friendly.

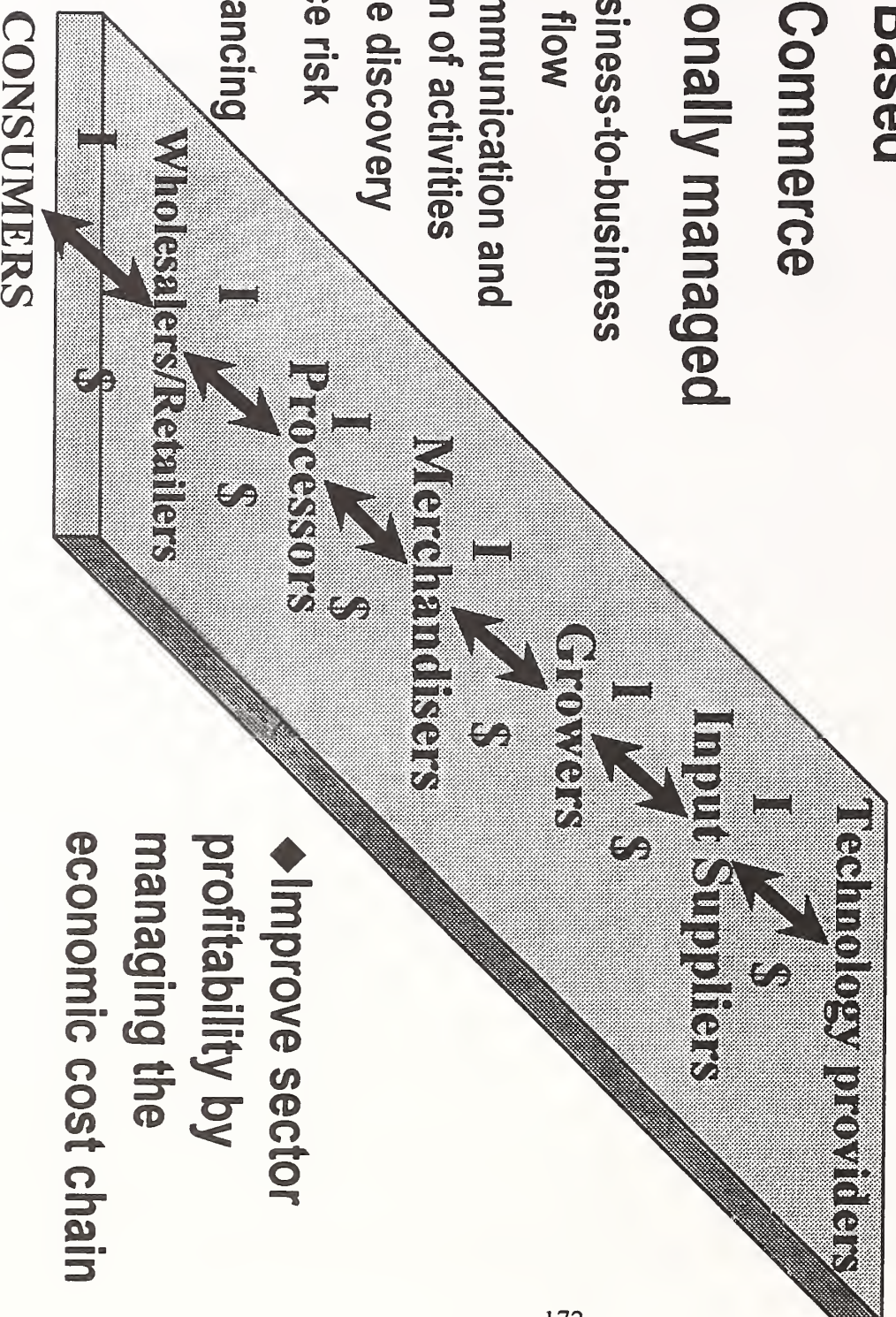
³ Peter F. Drucker, *Managing in a Time of Great Change* (New York: First Truman Talley Books/Plume, April 1998), 129

⁴Statement by Warren Bennis on the page entitled Praise for Peter Drucker and "Managing in a Time of Great Change" in the book by the same name (New York: Truman Talley Books/Plume, 1995).

21st Century “Virtually Integrated” Business Model for Agriculture

- ◆ Internet Based
- ◆ EIS & E-Commerce
- ◆ Professionally managed

- improve business-to-business information flow
- enhance communication and coordination of activities
- achieve price discovery
- manage price risk
- facilitate financing



- ◆ Improve sector profitability by managing the economic cost chain

EXAMPLE NUMBER ONE

For those producers who consider 1998 to be a lesson in what can happen if you don't have an insurance policy on price a simple "Walk Away" Agricultural Trade Option can be an attractive alternative to doing nothing or forward contracting. Another advantage of an ATO is that it allows a farmer to execute the option with an elevator, processor or merchant they know and trust; mostly local or nearby business establishments. The ATO can be tailored to fit each grower's individual situation as to quantity. It doesn't have to be for a fixed number of bushels like an exchange-traded option.

The expiration date can also be customized to meet each farmer's particular need. In fact the ATO can exceed the present exchange-traded option's one-year time frame. Under certain circumstances the farmer can buy a put and sell a call, thereby building a "fence" around a price range that he/she considers acceptable. This strategy will reduce the premium cost of the transaction.

In an exchange-traded option the strike price is for a specific dollar amount per bushel/pound. The same is true for an ATO. However, with a revenue assurance type ATO the strike price will be stated in total dollars per farm unit. And remember, this generic "Walk Away" ATO allows a farmer, for example, to legally walk away from the contract and sell his/her commodity to the highest bidder.

EXAMPLE NUMBER TWO

A moment ago I mentioned that the strike price could be "tied to a revenue assurance type ATO that would guarantee total dollars per farm unit." Here is one way this ATO might be offered to farmers.

A seed company wants to overcome the perception that a particular high oil corn seed has a yield drag problem. It negotiates the standard seed sales contract with the farmer, which, along with other considerations, would specify the number of acres to be planted and the premium to be paid per bushel. The Seed Company then writes a revenue assurance ATO using the number of acres and the December futures price plus the premium that has already been agreed to. It then adds to the equation the anticipated yield per acre. For example, 100 acres X 200 bushels per acre X \$2.50 (futures @\$2.20 + \$0.30 premium) per bushel. This results in a strike price of \$50,000.00 for that farm unit. The farmer pays a premium for that revenue guarantee. The Seed Company covers the price risk by using an exchange-traded derivative and an OTC weather derivative⁵ to cover the yield risk. Or it could turn to an intermediary in the OTC market, like Koch Industries or Enron Corporation, that would handle the price and yield risks. The intermediation costs would be included in the premium the Seed Company paid. Or the Seed Company could use a derivative and crop insurance to cover its risk. Keep in mind the farmer gets \$50,000.00 even if the price per bushel at

⁵ One type of weather derivative is based on indexes of Heating Degree-Days (HDD) and Cooling Degree-Days (CDD).

harvest is less than \$2.20 or even if weather related events preclude the farmer from delivering the 20,000 bushels. If the price at harvest for number two yellow corn is higher than \$2.20 then the farmer can "walk away" from the contract and sell it to the highest bidder. Also, it is important to remember the Seed Company would have to register as an Agricultural Trade Option Merchant (ATOM) and its sales people would have to register as Associated Persons (APs) in order to write, offer and execute an ATO.

EXAMPLE NUMBER THREE

The final example I will use covers a price risk management technique I believe will be given serious consideration by counterparties to ATOs. The operative principle is that of an Asian or Average Price option. According to the "Dictionary of Financial Risk Management," written by Gary L. Gastineau, an Asian option is, "An option whose settlement value is based on the difference between the strike and the average price (rate) of the underlying on selected dates over the life of the option, or over a period beginning on some start date and ending at expiration."

The following example is courtesy of Tim Andriesen of Koch Industries, Wichita Kansas. XYZ elevator, which is registered as an ATOM, is offering a "growing season" call option. This option pays off based on the average price of the December Futures contract between May 1 and July 31. This option struck at \$2.60 costs 7 cents. At the same time the December \$2.60 call is trading at 12.5 cents. The ATO contract between the farmer and XYZ elevator clearly states that the time frame and the absolute level of protection are less with the growing season Asian style option. However, the cost of this ATO is 5.5 cents less than the December call.

Given the random nature of markets there is something to be said in favor of a farmer selling for the average price over a given time frame. Predicting the weather and trying to outguess the market has its limitations. Even for those advisory services with state-of-the-art computer models and Ph.D. analysts.

Consider the following information from the AgMas Project at the University of Illinois: "the average net advisory (Fee based professional Market Advisory Service) corn price over the three years (1995-96-97) for the 19 programs is \$2.65 per bushel, which is two cents above the three-year market benchmark price of \$2.63." "The three-year average net advisory soybean price is \$6.73 per bushel, which is 17 cents above the three-year market benchmark price of \$6.65." The purpose of the AgMas Project is to present an evaluation of advisory service pricing performance. Complete information is available at <http://www.aces.uiuc.edu/~agmas/>.

Conclusion

President Clinton and Secretary of Agriculture Glickman have publicly announced their intention to provide a "safety net" for farmers. Congress is considering what shape this "safety net" program should take and how it might be funded. In the meantime there is

a process in place that will ultimately provide a "safety net" for farmers and I have described it in this presentation. That process would be greatly enhanced if the CFTC Agricultural Trade Option Pilot Program were amended as quickly as possible. As I said earlier, I believe the grain trade industry, producer associations and the CFTC are all working together in an effort to amend the Interim Final Rules in a way that will work for everyone concerned. I for one am optimistic that there will be an amended version by late spring or early summer.

Managing Risk Through Crop Insurance Value Added by Bundling Products

CROP INSURANCE

■ Protection against losses

(yield/quality and limited price protection)

■ Foundation for pre-harvest crop sales

(Gives courage to make decisions when prices are good and crop yields are uncertain)

It's Farm Financial Management that Works!

COMPLETE FINANCIAL \ RISK MANAGEMENT

Crop Insurance
Protection

+

Pre-harvest
Crop Pricing

=

Maximize Profits &
Reduce Risk

The Sign of an Approved Agent



"The Crop Insurance Industry Leader"

**1999 USDA Agricultural Outlook Forum
Arlington, Virginia
February 22-23, 1999**

by
E. Eugene Gantz
Senior V.P., Marketing/Public Relations
Rain and Hail L.L.C.

Managing Risk Through Crop Insurance Value Added by Bundling Products

E. Eugene Gantz
Sr. Vice President, Rain and Hail L.L.C.

Overview:

Crop insurance protection guarantees growers a pay day...either through crop production receipts or an insurance loss payment. It can provide excellent protection against low yields, poor quality and limited price risk when used alone. It is an excellent foundation for managing crop price and financial risks when bundled with board of trade crop pricing tools.

Bundling crop insurance products is a more sophisticated approach to formulating risk management portfolios that can result in added value for growers. This value occurs at the micro (crop protection) and macro levels (overall farm protection).

Why Bundle:

Bundling is done either to obtain more aggregate protection (i.e. to increase the price election used to calculate liability), add niche coverages or perils, or to get more protection per premium dollar by varying the deductibles.

Examples are:

More aggregate protection:

1. MPCl, corn @ \$2.10/ bu. + POP @ \$.50/ Bu. = \$2.60/ Bu. X Avg. Yield = Liability
2. MPCl and Crop Hail coverage for protection up to actual cash value and added cash flow protection.

Reduced cost:

Premium per acre can be reduced 35 to 65 percent while maintaining similar dollar amounts of protection (liability) by varying the deductible(s).

Comprehensive Financial Management:

Bundling crop insurance and board of trade pricing tools can manage the vast majority of the yield, quality and price risk and therefore provide broad financial management and profitability.

How Bundling is Done:

Start with a foundation of one of the federally sponsored plans because they are both comprehensive and subsidized. Their primary weakness is that deductibles and amounts of protection are correlated. In other words, if a grower decides to increase the self-insurance and increase the deductible from 25 to 30 percent, the amount of protection declines proportionately. This is in sharp contrast to other forms of insurance where the amount of protection and the size of the deductible are separate isolated decisions.

Illustrations of Bundling:

1. Side-by-side comparison of comprehensive and subsidized foundation coverage,
2. Combining products for maximum protection,
3. Cash flow protection from product aggregation,
4. Combining products to reduce cost by increasing deductibles while maintaining dollar amount of protection,
5. Combining crop insurance, market tools and farm bill safety-nets for maximum revenues,
6. Combining insurance and board of trade tools for yield and price management to maximize profits,
7. Quantifying the compound value of using crop insurance and hedging to reduce risk exposures,
8. Rules of thumb for crop insurance based hedging.

Summary:

Crop insurance has become the primary risk management tool of crop farmers. Today almost 70 percent of eligible U.S. are insured. The next big step may be farmers' crop insurance buying habits changing from buying a single coverage to a portfolio or bundled coverage approach as they become more sophisticated and proficient managers of risk for increased profit.

Figure 1.

COMPREHENSIVE CROP PROTECTION – Federally Sponsored and Cost Shared – Per Acre Illustration

CROP INSURANCE COMPARISONS – Central IA., Corn, NI																				
180 Bu./A. NI APH Farm – BOT Early Price \$2.35																				
Level	MPCI		Crop Revenue (CRG)				Income Protection (IP)				Revenue Assurance		Group Risk Plan (Triggers based off of county average yield)							
	Amount of Bu. Loss	Net Cost Per Trillion	Base CRG \$/Bu. @ \$2.35	Max Protect Net Cost Per Trillion	Base CRG \$/Bu. @ \$2.35	Max Protect Net Cost Per Trillion	Early BOT \$/Bu. @ \$2.35	Net Cost Per Trillion	Early BOT \$/Bu. @ \$2.35	Net Cost Per Trillion	Early BOT \$/Bu. @ \$2.35	Net Cost Per Trillion	County Avg. Level	Amount of Production	Yield	Amount of Net Premium*	Cost Per Bu. Minimum	Cost Per Bu. Maximum		
50%	\$108	00	\$1.36	\$0.07	\$1.00	\$0.00	\$1.00	\$0.00	\$1.00	\$0.00	NA	1997 RATES	70%	\$286	\$444	96.4	\$0.32	\$1.57	\$0.02	\$0.01
55%	\$105	00	\$1.05	\$0.02	\$3.07	\$0.04	\$2.07	\$0.04	\$2.07	\$0.04	NA	1997 RATES	75%	\$286	\$444	103.3	\$1.25	\$3.12	\$0.00	\$0.02
60%	\$102	00	\$0.72	\$0.00	\$2.28	\$0.00	\$2.28	\$0.00	\$2.28	\$0.00	NA	1997 RATES	80%	\$286	\$444	107.0	\$1.00	\$2.37	\$0.00	\$0.02
65%	\$100	00	\$0.40	\$0.00	\$1.49	\$0.00	\$1.49	\$0.00	\$1.49	\$0.00	NA	1997 RATES	85%	\$286	\$444	117.0	\$0.60	\$1.60	\$0.00	\$0.02
70%	\$100	00	\$0.40	\$0.00	\$1.49	\$0.00	\$1.49	\$0.00	\$1.49	\$0.00	NA	1997 RATES	90%	\$286	\$444	123.9	\$0.32	\$0.57	\$0.00	\$0.02
75%	\$100	00	\$0.40	\$0.00	\$1.49	\$0.00	\$1.49	\$0.00	\$1.49	\$0.00	NA	1997 RATES								
Central IA., Corn, NI																				
120 Bu./A. NI APH Farm – BOT Early Price \$2.35																				
Level	MPCI		Crop Revenue (CRG)				Income Protection (IP)				Revenue Assurance		Group Risk Plan (Triggers based off of county average yield)							
	Amount of Bu. Loss	Net Cost Per Trillion	Base CRG \$/Bu. @ \$2.35	Max Protect Net Cost Per Trillion	Base CRG \$/Bu. @ \$2.35	Max Protect Net Cost Per Trillion	Early BOT \$/Bu. @ \$2.35	Net Cost Per Trillion	Early BOT \$/Bu. @ \$2.35	Net Cost Per Trillion	Early BOT \$/Bu. @ \$2.35	Net Cost Per Trillion	County Avg. Level	Amount of Production	Yield	Amount of Net Premium*	Cost Per Bu. Minimum	Cost Per Bu. Maximum		
50%	\$120	00	\$1.20	\$0.02	\$1.41	\$0.00	\$1.41	\$0.00	\$1.41	\$0.00	NA	1997 RATES	70%	\$286	\$444	96.4	\$0.32	\$1.57	\$0.02	\$0.01
55%	\$118	00	\$1.18	\$0.00	\$1.56	\$0.00	\$1.56	\$0.00	\$1.56	\$0.00	NA	1997 RATES	75%	\$286	\$444	103.3	\$1.25	\$3.12	\$0.00	\$0.02
60%	\$114	00	\$1.14	\$0.00	\$1.69	\$0.00	\$1.69	\$0.00	\$1.69	\$0.00	NA	1997 RATES	80%	\$286	\$444	110.2	\$0.97	\$2.37	\$0.00	\$0.02
65%	\$110	00	\$1.10	\$0.00	\$1.83	\$0.00	\$1.83	\$0.00	\$1.83	\$0.00	NA	1997 RATES	85%	\$286	\$444	117.0	\$0.60	\$1.60	\$0.00	\$0.02
70%	\$107	00	\$1.07	\$0.00	\$1.97	\$0.00	\$1.97	\$0.00	\$1.97	\$0.00	NA	1997 RATES	90%	\$286	\$444	123.9	\$0.32	\$0.57	\$0.00	\$0.02
75%	\$104	00	\$1.04	\$0.00	\$2.12	\$0.00	\$2.12	\$0.00	\$2.12	\$0.00	NA	1997 RATES								

GENERAL COMPARISON OF MPCI, CRG, IP, AND GRP													
Topic	Unit Definition	Insurance Guarantee	Insurance Price	Pricing Movement Limit	Eligibility of Special Rerol Land	Group and State Availability	Pricing Election						
Basic and optional units	Coverage level times APH yield times indemnity price election												
Insurance Price	N/A unless private "Replacement Coverage" is included												
Pricing Movement Limit	MPCI – None With RC & MPCI – \$1.50, \$2.00 on soybeans												
Eligibility of Special Rerol Land	May be eligible												
Group and State Availability	About 80 crops nationwide												
Pricing Election	Corn – \$2.10 Cotton – Varies by area Soybeans – \$1.65 Special Rerol Land – \$2.25 Wheat – \$3.30												

80 and 85% coverage levels will be available in limited areas in '99.

See your "Rain and Hail" agent for details.

GENERAL COMPARISON OF MPCI, CRG, IP, AND GRP													
Topic	Unit Definition	Insurance Guarantee	Insurance Price	Pricing Movement Limit	Eligibility of Special Rerol Land	Group and State Availability	Pricing Election						
Basic, units, and Co. crop enterprise	Dollar amount of coverage – APH times level (50-75%) times APH times level (50-75%) times the early BOT Price												
Income Protection	County crop enterprise units												
Revenue Assurance	Basic, optional, Co. enterprise, APH times CBOT price – adjusted to county times level (minimum of 75% and maximum of 85%)												
Group Risk Plan	N/A – Indemnity triggers based on a county average												
Any dollar amount within an established maximum and minimum													
Grower chooses a deductible of 10-35% (65 – 80% coverage)													
N/A	100% of county posted prices determined by FSA												
N/A													
Eligible for coverage													
Most major crops nationwide													
N/A													
Corn – To be announced													
Soybeans – To be announced													

80 and 85% coverage levels will be available in limited areas in '99. See your "Rain and Hail" agent for details.

Revised 1/21/1999

Information Courtesy of Rain and Hall L.L.C., West Des Moines – "The Crop Insurance Industry Leader" 1-800-776-4045

*Adjusted for Emergency Relief Act Protection Bonus

GENERAL COMPARISON OF MPCI, CRG, IP AND GRP					
Topic	MPCI	Crop Revenue Coverage	Income Protection	Revenue Assurance	Group Risk Plan
Unit Definition	Basic and optional units	Basic units, and Co. crop enterprise units available for corn and soybeans	County crop enterprise units	Basic, optional, Co. enterprise, whole farm	N/A – Indemnity begins based on a county average
Insurance Qual- antice	Coverage level times APH yield times indemnity price election	Dollar amount of coverage – (APH times level (50-75%) times (100% (or 95%) of higher of the early or near harvest BOT near harvest price (grain sorghum 80 or 95% of BOT corn))	Dollar amount of coverage – (APH times level (50-75%) times the early BOT Price)	Dollar amount of coverage – (APH times CBOT price (minimum of 75% and maximum of 65%))	Any dollar amount within an established maximum and minimum. Grower chooses a deductible of 10-35% (65 – 90% coverage)
Insurance Price	N/A unless private "Replacement Coverage" (RC) is included	100% (or 95%) of the BOT for the near harvest average daily settlement prices (grain sorghum 90 or 95% of BOT corn)	100% of the average daily BOT near harvest time future marketing closing price	100% of county posted prices determined by FSA	N/A
Price Move- ment Limit	MPCI – None With RC & MPCI – \$1.00 on corn, Wheat \$1.50, \$2.00 on soybeans	\$1.50/bu. on corn and grain sorghum \$3.00/bu. on soybeans \$2.00/bu. on wheat	N/A	N/A	N/A
Eligibility of Special Re- leased Land	May be eligible	Eligible for coverage	Not eligible for coverage	Eligible for coverage	Eligible for coverage
Crop and State Availability	About 80 crops nationwide	Selected states and counties for corn, cotton, grain sorghum, soybeans, and wheat.	Selected states and counties for corn, cotton, milo, soybeans, and wheat	Selected states and counties for corn, soybeans, and wheat.	Most major crops nationwide.
Price Election – 1989	Corn – \$2.10 Cotton – Varies by area Grain Sorghum – \$1.85 Soybeans – \$1.25 Wheat – \$3.25	Corn – To be announced Cotton – To be announced Grain Sorghum – To be announced Soybeans – To be announced Wheat – \$2.89 - \$3.40 by type	Corn – To be announced Cotton – To be announced Grain Sorghum – To be announced Soybeans – To be announced Wheat – \$3.66 - \$4.04 by type	Corn – To be announced Soybeans – To be announced	N/A

80 and 85% of levels will be in limited areas

See your "Rural agent for

Figure 2.

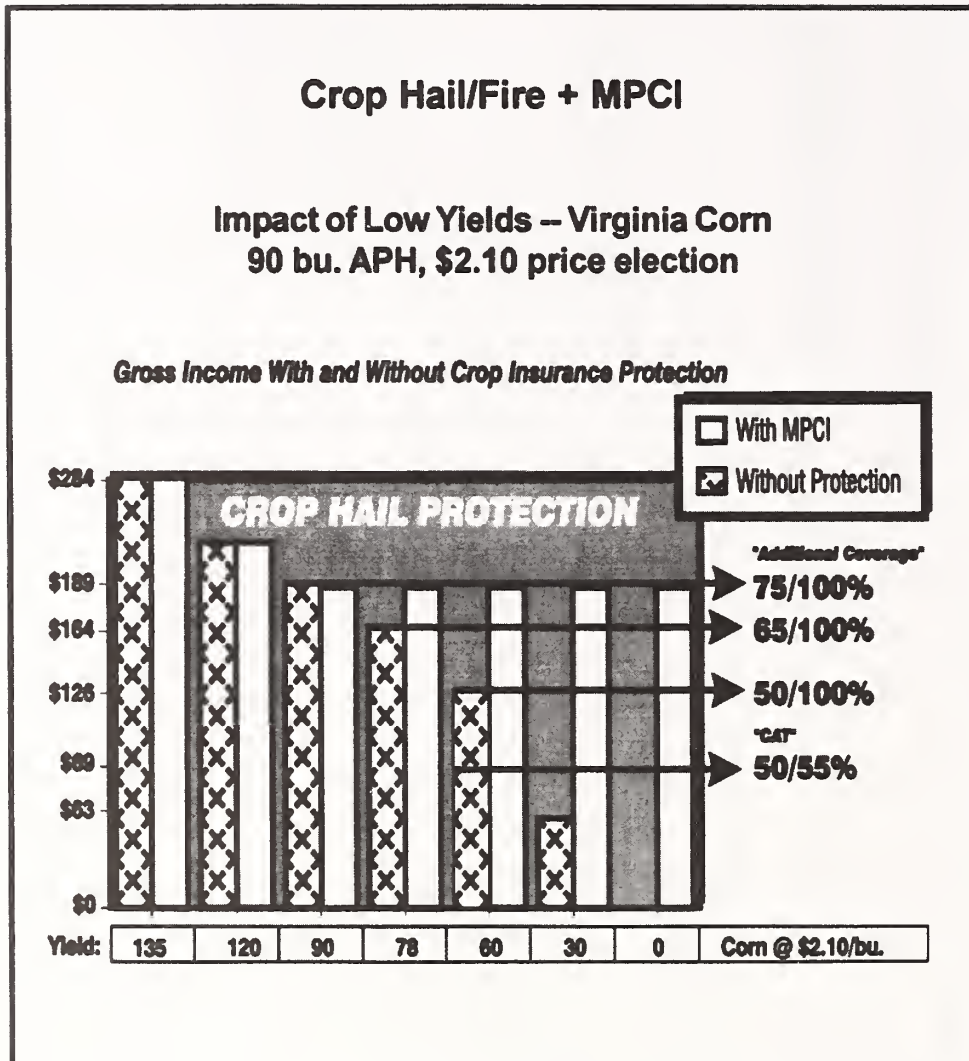


Figure 3.

BLENDED COVERAGE ILLUSTRATIONS

Objective: Maximum Protection From Different Blends of Coverage

Central Iowa Corn Example

120 bu./a. APH, NI, 1,000 acres

CROP REVENUE COVERAGE at \$2.35/bu. (Use this gross income guarantee to manage yield, quality and hedging risk.)¹

Plan	Liability Protection	Max Protection ²	Bu. Guarantee	Farmer's Premium ³
65/100	\$ 183,000	\$ 300,000	N/A	\$ 5,070
70/100	\$ 197,000	\$ 323,000	N/A	\$ 7,390
75/100	\$ 212,000	\$ 347,000	N/A	\$ 10,750

MULTIPLE PERIL COVERAGE at \$2.10/bu. (Use this comprehensive yield guarantee coverage as the foundation to manage risk.)¹

Plan	Liability Protection	Bu. Guarantee	Farmer's Premium ³
CAT	\$ 69,000	60,000	\$ 60
65/100	\$ 164,000	78,000	\$ 2,810
70/100	\$ 176,000	84,000	\$ 4,290
75/100	\$ 189,000	90,000	\$ 6,480

PRICE OPTION PLUS AND MP (Use for maximum protection based on yield guarantee by using the price election.)

Plan	Liability Protection	Bu. Guarantee	Farmer's Premium
MP 75/100	\$ 189,000	90,000	\$ 6,480
POP 50¢/Bu.	\$ 45,000	90,000	\$ 2,800
Total	\$ 234,000		\$ 9,280
MP 65/100	\$ 164,000	78,000	\$ 2,810
POP 50¢/Bu.	\$ 39,000	78,000	\$ 1,600
Total	\$ 203,000		\$ 4,410

INCREASING PAYMENT AND MP (Use to reduce risk of hedging by replacing bushels when MP loss occurs.)

Plan	Liability Protection	Bu. Guarantee	Farmer's Premium
MP 75/100	\$ 189,000	90,000	\$ 6,480
IN 50/63¢/Bu.	\$ 37,800	60,000	\$ 830
	\$ 226,800		\$ 7,310
MP 65/100	\$ 164,000	78,000	\$ 2,810
IN 50/\$1.05/Bu.	\$ 63,000	60,000	\$ 1,390
	\$ 227,000		\$ 4,200

REPLACEMENT COVERAGE AND MP (Use to reduce risk of hedging by replacing bushels when MP loss occurs.)

Plan	Liability Protection	Bu. Guarantee	Farmer's Premium
MP 75/100	\$ 189,000	90,000	\$ 6,480
RC \$1.00/bu.	\$ 90,000 max. *	90,000	\$ 2,340
			\$ 8,820
MP 65/100	\$ 164,000	78,000	\$ 2,810
RC \$1.00/bu.	\$ 78,000 max. *	78,000	\$ 1,330
			\$ 4,140

* Triggers only if market moves.

* Triggers only if market moves and production loss occurs.

CROP HAIL (Use for acre-by-acre protection from crop hail. Can protect bumper crops up to actual cash value; covers MP deductible for losses due to hail damage.)

Liability Protection	Farmer's Premium
\$ 400,000 (\$400/A. x 1,000 A.)	\$ 8,000

¹ MPCl is available to all producers regardless of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status.

² Coverage can increase up to this amount if CBOT harvest price increases max of \$1.50.

³ Fee can be waived for qualifying "Limited Resource Farmers".

⁴ Premium is adjusted to reflect the Emergency Relief Protection Bonus.

Figure 4.

BLENDED COVERAGE ILLUSTRATIONS

Objective: 75/100 MP Equivalent Liability at Less Cost from Blended Coverages
Central Iowa Corn Example
120 bu./a. APH, NI, 1,000 acres

CROP REVENUE COVERAGE at \$2.35/bu. (Use this gross income guarantee to manage yield, quality and hedging risk.)¹

Plan	Liability Protection	Max Protection ²	Bu. Guarantee	Farmer's Premium ³
65/100	\$ 183,000	\$ 300,000	N/A	\$ 5,070
70/100	\$ 197,000	\$ 323,000	N/A	\$ 7,390
75/100	\$ 212,000	\$ 347,000	N/A	\$ 10,750

MULTIPLE PERIL COVERAGE at \$2.10/bu. (Use this comprehensive yield guarantee coverage as the foundation to manage risk.)¹

Plan	Liability Protection	Bu. Guarantee	Farmer's Premium ³
CAT	\$ 69,000	60,000	\$ 60
65/100	\$ 164,000	78,000	\$ 2,810
70/100	\$ 176,000	84,000	\$ 4,290
75/100	\$ 189,000	90,000	\$ 6,480

MP with private enhancements to increase MP 65/100 to liability to about \$189,000 (75/100 MP)

PRICE OPTION PLUS AND MP (Use for maximum protection based on yield guarantee by using the price election.)

Plan	Liability Protection	Bu. Guarantee	Farmer's Premium
MP 65/100	\$ 164,000	78,000	\$ 2,810
POP 40¢/Bu.	\$ 31,200	78,000	\$ 1,280
Total	\$ 195,200		\$ 4,090

Cost of MP 75/100	\$ 6,480	
Premium Savings	\$ 2,390	35% Reduction

INCREASING PAYMENT AND MP (Use to reduce risk of hedging by replacing bushels when MP loss occurs.)

Plan	Liability Protection	Bu. Guarantee	Farmer's Premium
MP 65/100	\$ 164,000	78,000	\$ 2,810
IN 50/42¢	\$ 25,200	60,000	\$ 550
	\$ 189,200		\$ 3,360

Cost of MP 75/100	\$ 6,480	
Premium Savings	\$ 3,120	50% Reduction

REPLACEMENT COVERAGE AND MP (Use to reduce risk of hedging by replacing bushels when MP loss occurs.)

Plan	Liability Protection	Bu. Guarantee	Farmer's Premium
MP 65/100	\$ 164,000	78,000	\$ 2,810
RC 50¢/Bu.	\$ 39,000 max. *	78,000	\$ 1,130
			\$ 3,940

* Triggers only if market moves and production loss occurs.

Cost of CRC 75/100	\$ 10,750	
Premium Savings	\$ 6,810	65% Reduction

CROP HAIL (Use for acre-by-acre protection from crop hail. Can protect bumper crops up to actual cash value; covers MP deductible for losses due to hail damage.)

Liability Protection	Farmer's Premium
\$ 200,000 (\$200/A. x 1,000 A.)	\$ 4,000

¹ MPCI is available to all producers regardless of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status.

² Coverage can increase up to this amount if CBOT harvest price increases max of \$1.50.

³ Fee can be waived for qualifying "Limited Resource Farmers".

⁴ Premium is adjusted to reflect the Emergency Relief Protection Bonus.

Figure 5.



c:\charts\market_new.cdr

Figure 6.

ARM Program Scenarios For Your Farm

The Allendale Risk Management program (ARM) is a complete risk management program that combines Risk and Harvest crop insurance program and Allendale's marketing program.

Given

What is your avg yield
will need 4 yr history

120

Do you currently use crop insurance?

If so, what kind, what levels, what is your purpose for having crop insurance?

What is your cost of production per acre?

250

What percent insurance coverage do you want (75)

75

Estimated insurance premium (15/5)

15

What do you think the Feb price of Dec futures (the base price 2.70)

2.35

Where do you feel you can get Dec futures hedged at (2.85)

2.50

Which call option would you buy for upside protection (3.10)

2.80

How much option premium do you think you will need to pay (.12)

0.10

Your calculated insured yield is

90.00

Your calculated revenue base is

108.30

Your calculated break even per bushel (based on average yields)

2.08

Your actual break even per bushel (based on actual yields)

1.79

Examples	Assumptions	Actual yield	Scenario A
			1.00
			1.00
Examples of no ARM			
If you do not hedge			
Free mt.	Actual yield	140	
	Actual fall price	1.00	
	Gross income	280	
If you use the ARM program			
Free mt. Insured bu	60 X hedge	2.80	123.00
Excess bu	60 X fall pr	1.00	60.00
Options:	Cost of calls on insured bu	9.00	
	Option payment	9.00	
Insurance	Cost of insurance	18.00	
	Recalculated revenue base	211.50	
	Insurance payment		
	If actual yld X fall pr < rev base, then = prmt	0.00	
	Gross income	295.00	

Note: The above worksheet is strictly a simulation of revenue based on a set of assumptions. Any variation of positions or differences of actual yields and/or prices other than those stated above could cause a substantial reduction in performance.

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Allendale Inc. 1-800-2 MARKET (262-7638)

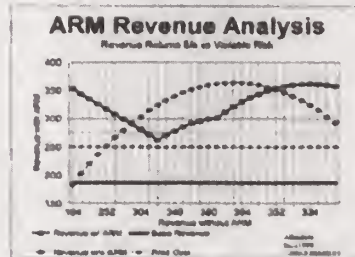
Broker Name: Allendale marketing specialist

Producer Name: Good Producer

Producer Phone: 1 800 262 7638

4606 Pines Parkway

McHenry IL 60050



Note: Analytical formulas assume a fixed supply price elasticity. Actual elasticity could vary results.

Examples	Assumptions	Actual yield	Scenario B
			60
			4.00
Examples of no ARM			
If you do not hedge			
Free mt.	Actual yield	60	
	Actual fall price	4.00	
	Gross income	240	
If you use the ARM program			
Free mt. Insured bu	60 X hedge	2.80	168.00
Excess bu	30 X fall pr	4.00	120.00
Options:	Cost of calls on insured bu	9.00	
	Option payment	9.00	
Insurance	Cost of insurance	18.00	
	Recalculated revenue base	360.00	
	Insurance payment		
	If actual yld X fall pr < rev base, then = prmt	120.00	
	Gross income	389.00	

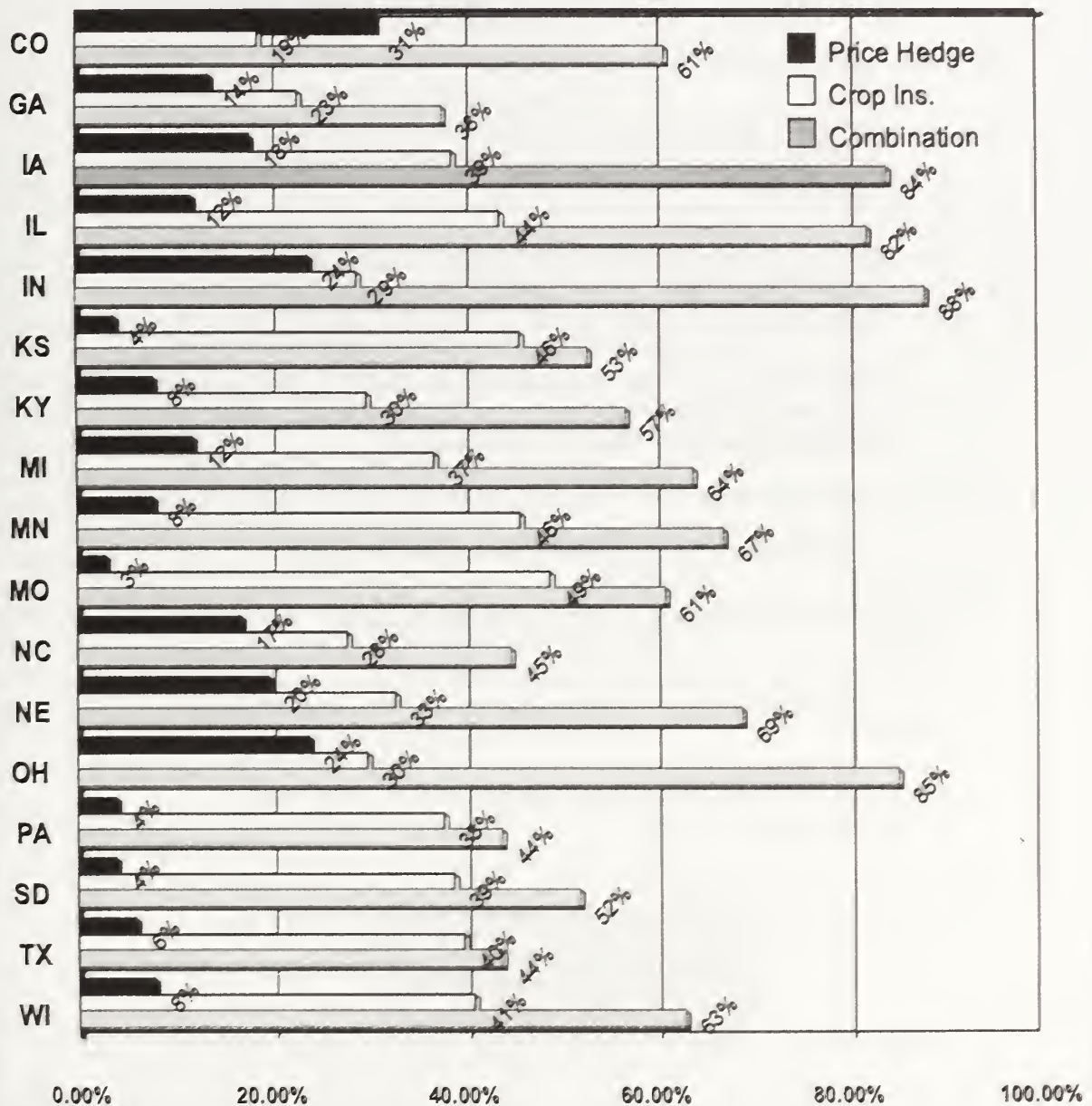
The thoughts expressed and the basis data from which they are drawn are believed to be reliable but cannot be guaranteed. Any opinions expressed herein are a subject to change without notice. Allendale Inc. is not a financial institution and does not provide any financial services. Allendale Inc. is not a financial institution and does not provide any financial services. Allendale Inc. is not a financial institution and does not provide any financial services. Allendale Inc. is not a financial institution and does not provide any financial services.

Figure 7.

RISK MANAGEMENT of CORN GROSS INCOME

Value of Various Tools

% Reduction in Probability of <70% of Expected Gross Revenue



Avg. county estimates by state; Source: ERS/USDA
Information courtesy of Rain & Hail - The industry leader 1-800-776-4045

Figure 8.



- ★ Hands-on assistance for the grower
 - Farmers Trading Company works with the grower to implement a marketing plan by providing advice on market conditions and pricing opportunities
 - Most customers are more comfortable with cash contracts at the local elevator--Farmers Trading Company helps them place these contracts
 - Hamaker Insurance provides crop insurance advice and services as a foundation for preharvest marketing--No-Compete on Crop Insurance for Farmers Trading Co. customers
-

Farmers Trading Company 1998 Results

New Crop:

- ★ 50% of the corn crop insurance bushel guarantee priced at \$2.80 or greater
- ★ 60% of the soybean crop insurance bushel guarantee priced at \$6.54 or greater
- ★ Hedge to arrive contracts are being used successfully in areas with unfavorable basis

Old Crop:

- ★ Sold all remaining corn in April at \$2.45 (current cash price is \$1.90)
- ★ Sold 50% of the soybean crop in February at \$6.47
- ★ Sold remaining soybean crop in May at \$6.25 (current cash price is \$5.57)

Figure 9.

FARM FINANCIAL PLANNING

Based on Crop Insurance



I. Crop Insurance Provides *Farm Specific* -

1. Low **yield** \ poor **quality** protection
2. Limited **price** protection
3. **Guarantees** (up to 75% of historical yield) can be *basis for early hedging decisions* (before crop yield is known) and
4. **Prevented planting guarantees** (up to 70% of planted guarantees) can be the *basis for very early hedging decisions* (before crop is planted).
5. **Crop Hail coverage** (up to ACV) can be the basis for late season pre-harvest sales to cover the extra yield of bumper crops in the field and MP deductibles.

II. Pre-harvest Sales -

1. **Floor** under crop prices,
2. Opportunities to **maximize profits**, and
3. **Reduces farm storage** needs and costs.

III. Ag Credit -

1. Operating loans to **grow** and **market** the crop
2. Crop insurance is **liquid collateral to secure loans**
3. Some lenders are considering **more favorable terms** when growers
 - * Have **adequate** crop insurance **protection**,
 - * **Hedge** their crops, and
 - * **Assign the "loss proceeds"** to lender.

The Sign of an Approved Agent



"The Crop Insurance Industry Leader"

Figure 10.

200,000 Farmers Choose RAIN AND HAIL Insurance Services!

Crop insurance companies are not created equal!

■ **Professional Premier Service**
200,000 policyholders insuring 450,000 crops (MP & CH) through Rain and Hail (40% more than nearest competitor)

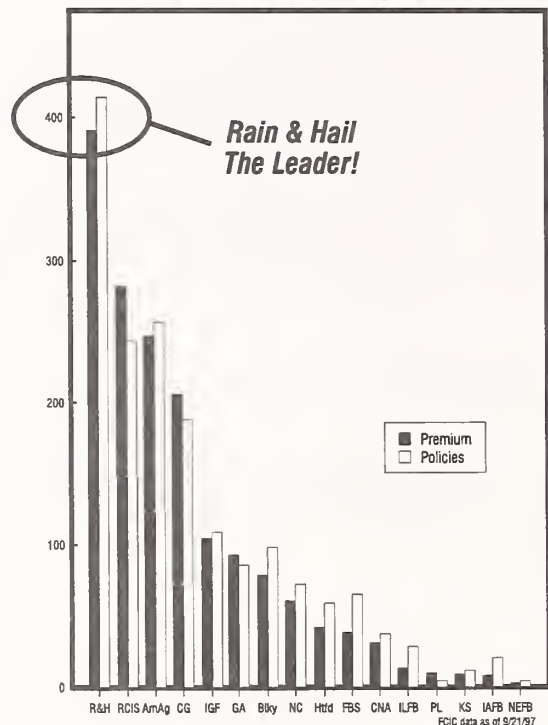
■ **Financial Strength - Assures Capacity and Ability to Pay Claims**
Each policy is backed by billions of dollars; CIGNA (\$99 billion), Agri General and the strongest reinsurers.

■ **Fast Claims Service Since 1919**
Claims are paid in about 15 days. A reputation built on prompt service and financial soundness.

■ **Right Products to Manage Today's Risks**
MPCI, CRC, IP, RA, POP, RC, IN, RPO, Crop Hail, and other specialized coverages

■ **Industry Leader Recognized Worldwide**
Largest writer of MPCI each year since the mid-1980s

Farmers Confidence in the MPCI Companies
MPCI Premium/Policies Sold by Private Organizations



Contact a Rain and Hail agent today!

THANKS!
For making
Rain and Hail
the largest
writer again!



Ask About
the 1999
Protection
Bonus!

Get your crop insurance
check-up from the industry leader!

to keep you financially healthy

Opening Remarks

Donald M. Bay, Administrator
National Agricultural Statistics Service, USDA

I am delighted to moderate this afternoon's session on "USDA Agricultural Statistics--The Census and Beyond." I look forward to hearing from our three panelists: Joe Reilly, Fred Vogel, and Joe Coffey, as well as to respond to your questions and comments after their brief presentations.

The transfer of the census of agriculture from the Bureau of the Census to the Department of Agriculture's National Agricultural Statistics Service (NASS) was probably the most important single change ever made in the field of agricultural statistics. The merger of these two major agricultural statistics programs happened in 1997 with very little fanfare. However, it was only possible due to the assistance of many people, including the Secretary and Deputy Secretary of Agriculture, the Director of the Bureau of the Census, and the Chief Statistician at OMB. We even had to withstand an informal survey by a Senate staffer who asked farmers in their States if they would prefer to report on the census of agriculture on a voluntary or mandatory basis. We insisted that we needed to follow the same process to maintain comparability with past censuses.

We faced a major challenge to maintain comparability and, at the same time, make use of the NASS infrastructure to improve the census. First, we were very fortunate that 85 percent of those assigned to work on the census of agriculture when it was at the Bureau of the Census chose to transfer to USDA, NASS. Second, the Bureau of the Census permitted NASS to continue to use its processing software as well as its central processing center in Jeffersonville, Indiana, to collect and initially process the census data. And, we wanted to utilize NASS's 45 State offices to improve the public relations, i.e., toll-free numbers, use of NASS trained enumerators, and State office staff for data review. Also, streamlining of the data review process contributed to our ability to release data earlier than was done in previous censuses.

With extensive direct follow-up by telephone, we were able to eliminate the final two follow-up mailings and still have the total response rate exceed 1992.

The whole process went smoothly considering the tremendous extra workload that was placed on almost everyone in NASS to take 10 months out of the usual processing schedule. Many of you here today helped us achieve a better response by supporting the need for the census of agriculture.

One of the very important changes in bringing the census together with the current agricultural statistics program was that it provided NASS with a nearly complete and current list of all farmers, including considerable individual farm data that will help us in the future to do a more efficient job in collecting current agricultural statistics.

Quick Facts from the Census of Agriculture

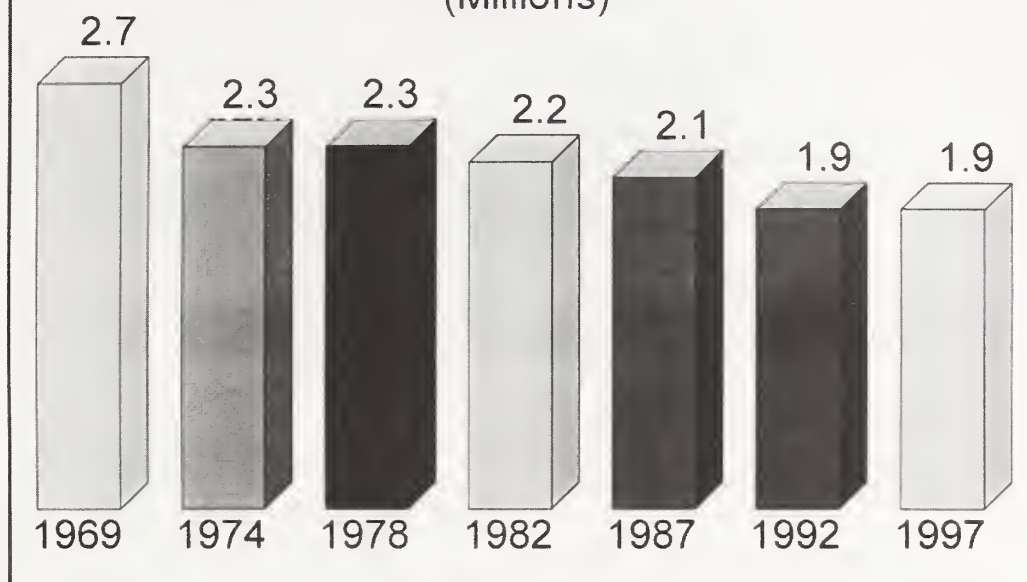
**Joe T. Reilly
Director, Census Division
National Agricultural Statistics Service
USDA**

The 1997 Census of Agriculture defined a farm as any place from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the reference year.

Census Count of Farms:

1969 to 1997

(Millions)

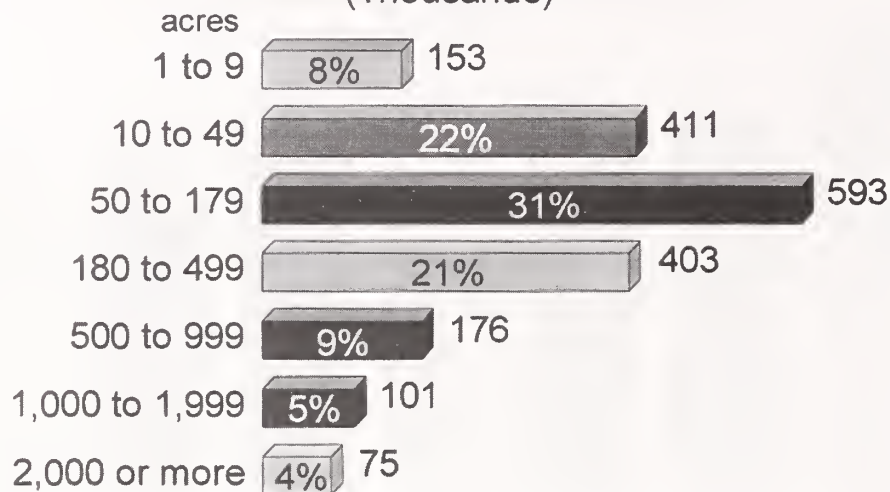


Net Cash Return From Agricultural Sales: 1997

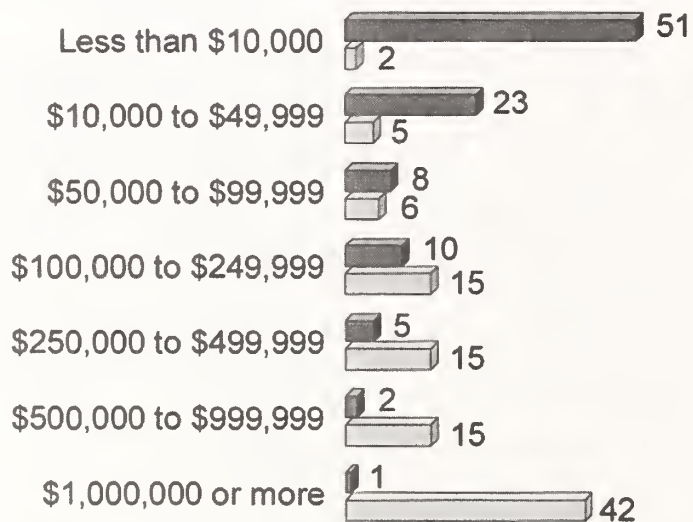
Farms	Net cash return (billions of dollars)	Average per farm (dollars)
All farms		
1,911,859	\$42.6	\$22,260
Farms with sales of \$500,000 or more		
68,795	\$25.7	\$373,731
Farms with sales of \$100,000 to \$499,999		
264,627	\$15.3	\$57,908
Farms with sales of \$10,000 to \$99,999		
613,741	\$4.2	\$6,743
Farms with sales less than \$10,000		
964,696	\$-2.6	\$-2,711

Farms by Size: 1997

Average Size of Farm: 487 Acres
(Thousands)



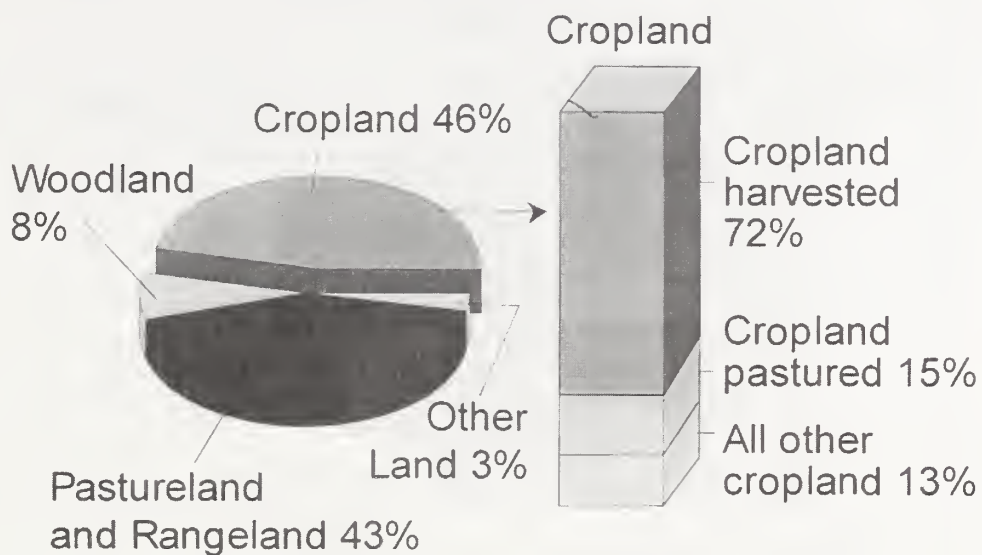
Distribution of Farms by Sales: 1997



■ Percent of Farms ■ Percent of Sales

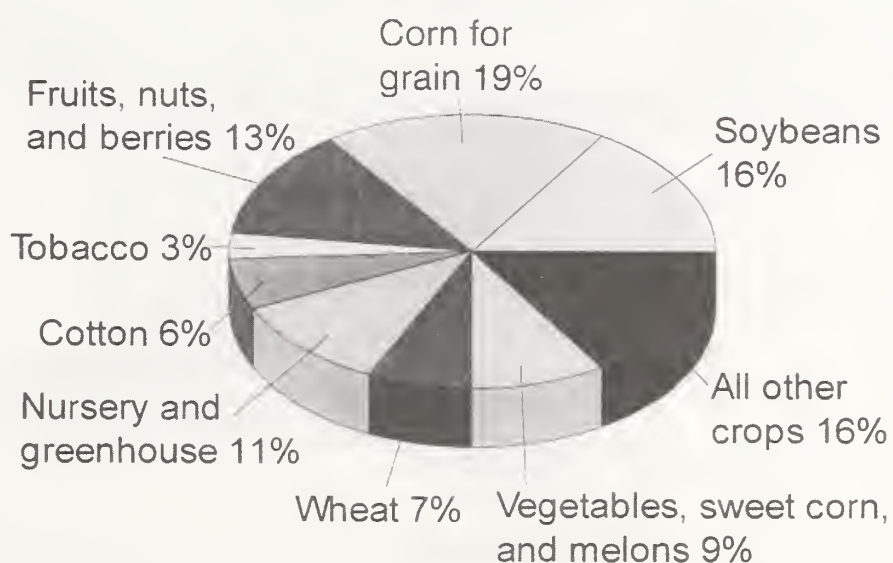
Land Use: 1997

Total Acres : 931,795,255



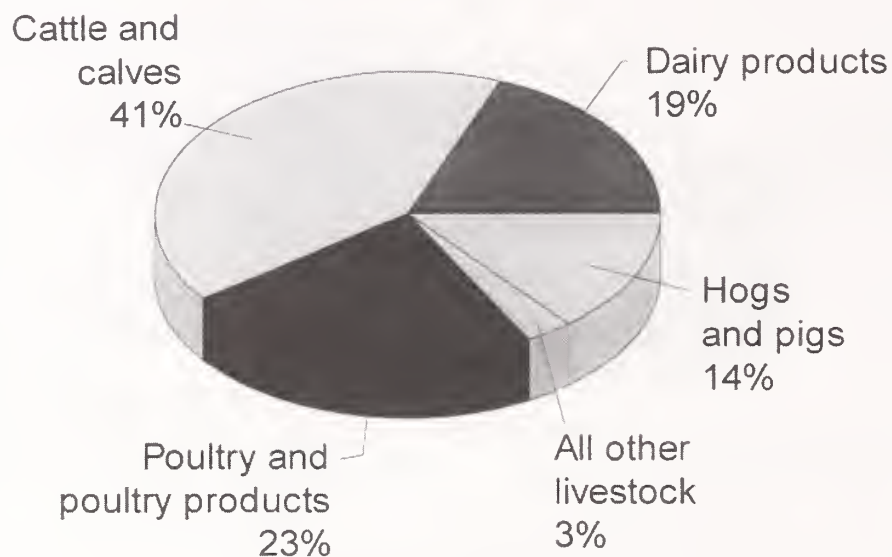
Value of Crops Sold: 1997

U.S. Total: \$98 Billion



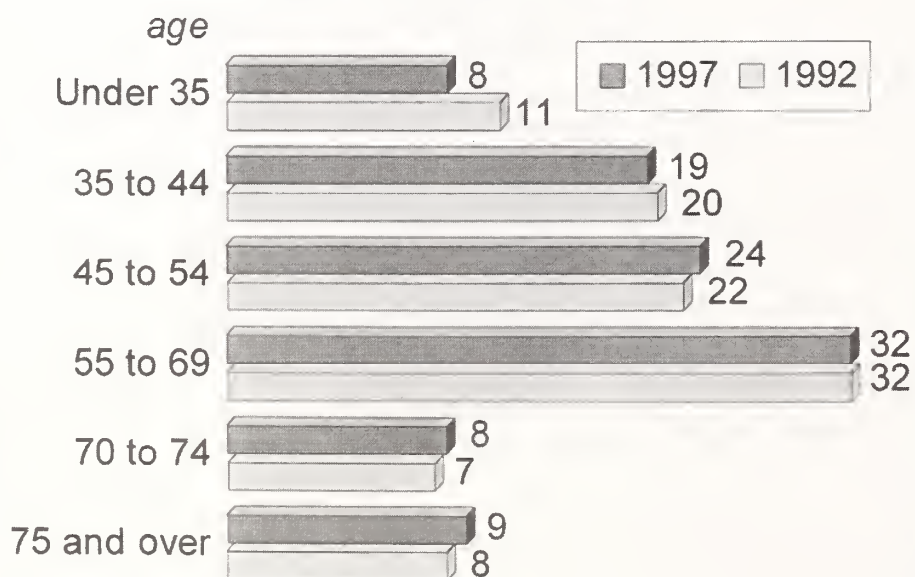
Value of Livestock and Poultry Sold: 1997

U.S. Total: \$99 Billion

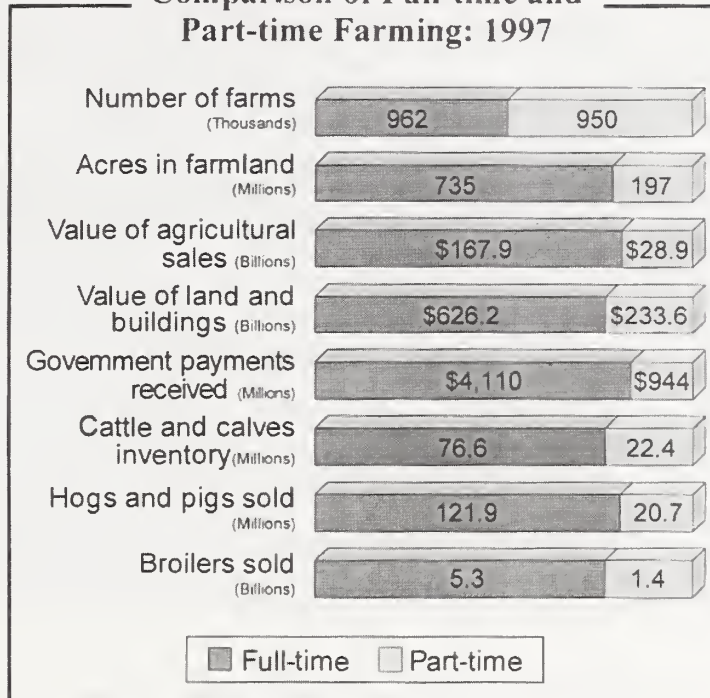


Percent of Farm Operators by Age Group: 1997 and 1992

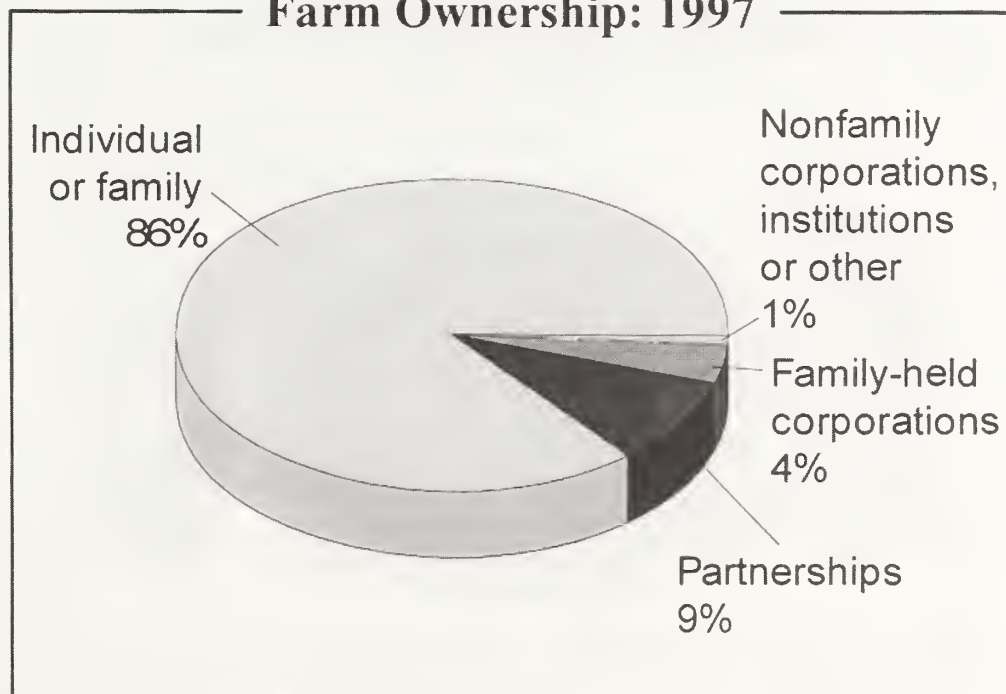
Average Age: 54.3 Years



Comparison of Full-time and Part-time Farming: 1997



Farm Ownership: 1997

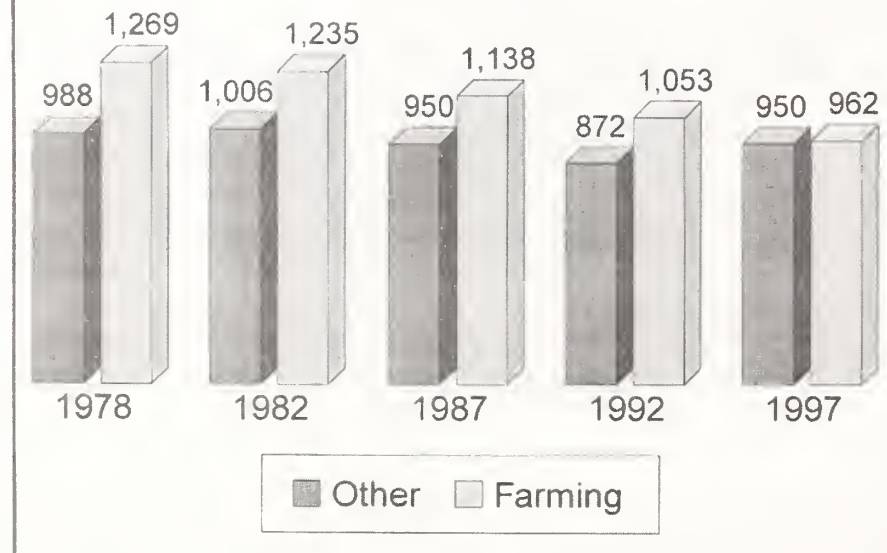


Tenure of Operator: 1997

	Full owners	Part owners	Tenants
Number of farms	1,146,891	573,839	191,129
Average acres per farm	276	885	565
Average sales per farm	\$68,771	\$160,680	\$134,918

Operators by Principal Occupation: 1978 to 1997

(Thousands)



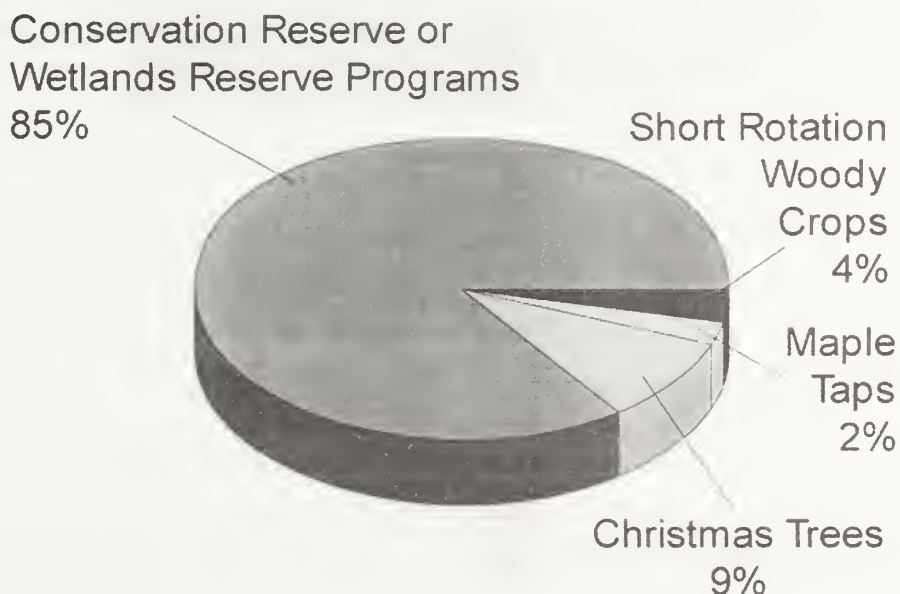
Farms Operated by Women, Persons of Spanish Origin, and Specified Racial Groups: 1997 and 1992

	1997	1992
Women.....	165,102	145,156
Spanish origin.....	27,717	20,956
Black	18,451	18,816
American Indian.....	18,495	N/A
Individually reported	10,477	8,346
Other ¹	8,018	N/A
Asian/Pacific Islander.....	8,731	8,096
Other	9,838	8,229

¹ Operators on reservations who did not report individually.

New Farm Types In the Census

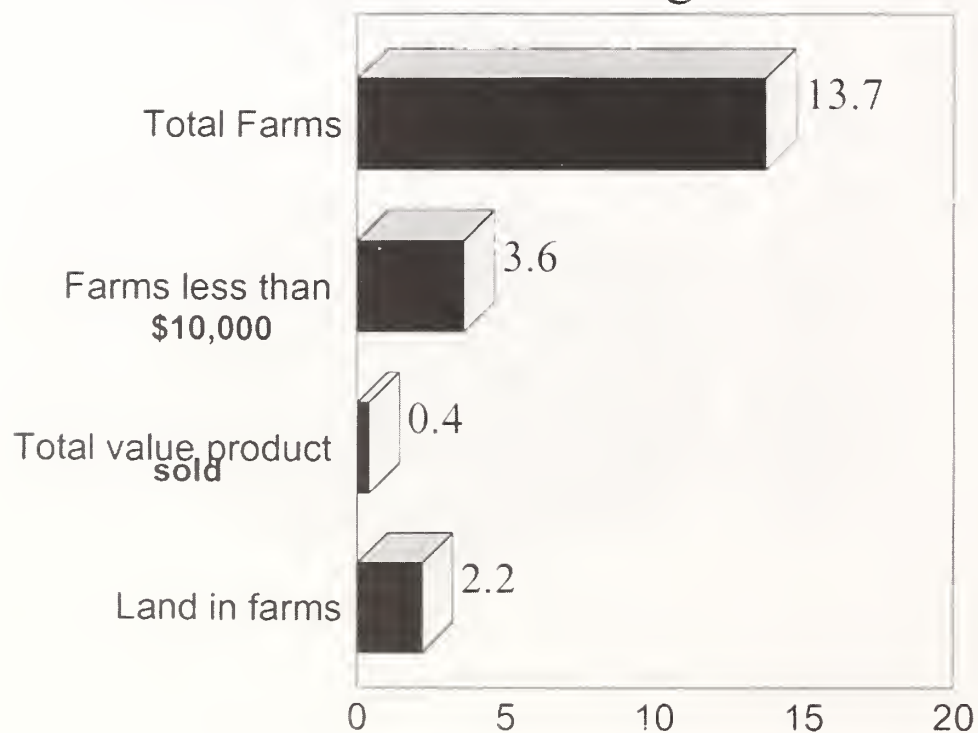
U.S. Total: 75,000 Farms



Average Farm: 1997

Average Size of Farm (acres)	487
Average Estimated Value of Land and Buildings	\$449,748
Average Value per Acre	\$933
Average Total Value of Products Sold	\$102,970
Average Net Cash Return	\$22,260
Average Production Expenses	\$78,771
Average Value of Machinery and Equipment	\$57,678
Average Age of Operator	54.3
Average Years on Present Farm	20.1

Census Coverage: 1997



The 1997 Census of Agriculture is the most comprehensive source of statistics portraying our Nation's agriculture. This census provides a detailed look at agriculture in each of the Nation's 3,000 plus counties. These data, available in printed, CD-ROM, and other electronic formats, provide a complete statistical picture of U.S. farms and ranches every 5 years.

For more information, contact:
NASS Customer Service Center
Census of Agriculture
Room 5829 South Building
1400 Independence Avenue, SW
Washington, DC 20250-2000

Telephone: 1-800-727-9540
E-mail: nass@nass.usda.gov
Internet: <http://www.usda.gov.nass>

Planning the Statistics Program for the Future

Fred A. Vogel, Director, Estimates Division
National Agricultural Statistics Service, United States Department of Agriculture

1.0 INTRODUCTION

The purpose of this paper is to present how NASS plans to review its program of agricultural statistics, which now includes the Census of Agriculture. The paper will also discuss some issues to be faced.

The timing of the transfer of the Census to NASS meant that the content had largely been determined. In order to complete the census in a timely manner, there was little time to integrate census activities with the on-going sample survey program. As a result, parallel systems were conducted in 1998 which meant some redundancy occurred.

The effort to reconcile census numbers with previously published estimates of everything from farm numbers to crop production and livestock inventories was complicated because some census terms and definitions were different from those traditionally used by NASS.

Between now and the 2002 Census, NASS intends to integrate the data requirements across the survey and census programs as well as harmonize all terms and definitions. This will be done against a backdrop of some significant changes going on in agriculture that also need to be considered.

These trends will be reviewed followed by a discussion about how they will affect the review of the statistics program. Then the strategy to be followed to evaluate and update the statistics program will be presented.

2.0 TRENDS SHAPING THE FUTURE OF AGRICULTURE

Significant trends are currently underway that will have a major impact on agriculture. The fact they are happening at the same time makes them even more significant because of the cause and effect relationships between them. These trends which include technology, the changing role of governments, structural changes in agriculture, and the globalization of trade and markets, are developing at a faster pace than at any similar time in history. These trends will be explored in more detail followed by the resulting consequences and data requirements.

- 2.1** *Technology* The rapid advancements in genetic engineering are now providing crop varieties that are pest and disease resistant. These are rapidly being followed by crops being developed for a specific purpose, for example, a significant acreage is being devoted to high oil corn. As significant, this corn acreage is produced under contract which will have consequences on the structure of agriculture. Soon to follow will be crops designed

to produce a feed that combined with a genetically designed livestock or poultry specie will produce a food product with desired dietary characteristics. These products will be the result of alliances formed between the food producers and the food processors. The advancements in computer technology are causing an information explosion. The use of Internet has almost overnight given the most remote locations access to all of the information in the world. This is raising new requirements for the speed of information delivery and will be adding pressure to statistical organizations to make use of the technology already being embraced by their data providers and customers.

2.2 Changing Role of Governments A common occurrence for countries around the world, whether they are developing or developed, is that the role of governments in agriculture is changing. Countries with huge populations and agricultural production are moving from planned economies to market economies. This development accompanied by a decrease or entire elimination of production controls in even the most developed countries means that agricultural producers rather than governments will be deciding what to produce. This will lead to more volatility in levels of production than seen in the past with resulting wider swings in prices.

As governments get out of the role of mandating production and marketing controls, they are increasingly involved in monitoring the affect of agriculture on the environment and food safety issues. These are posing new data challenges. There is a growing need to statistically measure possible contamination of food products as they move from the field through the processing stages. Some governments are considering the use of source labeling to follow a product from its source through the food chain. Source labeling will be used as both a marketing tool as well as an environmental, food safety, and animal health monitoring procedure.

2.3 Structure of Agriculture is Changing This trend has been underway for some time, but is being accelerated by technology and the changing role of governments. First is the growing number of small part time farms. For many households, this is to preserve a way of life and supplement the family income. These small farms, if they produce anything for sale, produce mainly for local or “niche” markets. They can also often avoid some of the government regulations that affect the large commercial operations.

A smaller number of large commercial farms is accounting for the majority of the agricultural production. In the U.S., only about 300,000 farms out of about 2.0 million account for over 85 percent of the agricultural production. Because of the technological developments discussed above, these large commercial farms will produce commodities under contractual arrangements with either a seedstock company or a food processing company.

The changing structure is being accompanied by a rise in the size accompanied by a reduction in the number of Multi-National companies that control “farm to dinner” biotechnologies and pipelines. In the U.S., few companies are rapidly gaining ownership of the seed industry which means with their genetic engineering capabilities they will control the seedstock of agriculture. These companies are forming alliances with grain

merchandising companies. Some with their network of grain elevators and feed manufacturing facilities have also entered into the livestock production business with large cattle feedlots and extensive hog production facilities. Alliances between companies in seedstock and grain merchandising means that the large commercial farming operations will be part of a contractual chain that links plant and livestock seedstock with the production, marketing, processing and retail distribution pipelines. Boundaries between the production, processing, and marketing of agricultural commodities will become blurred.

- 2.4** **Globalization of Trade and Markets** Primarily the result of the reduction of trade barriers and restrictions, and the improved flow of information, the world is quickly becoming a global market rather than a national market. Price discovery in the futures exchange in Chicago is driven as much by news about the U.S. crop as it is about developments in China or Australia. As the markets become more world oriented, it is quickly becoming apparent there is a huge need for better information about the current supplies and prospects for future supplies for all production regions.

There is also a blurring of national boundaries and a rising need for information about production regions. For example, the northern great plains region of the U.S. produces the same wheat grown across the border in Canada. The wheat market needs information about the supplies, both current and projected for this region, with little need for country level data.

3.0 RESULTING DATA REQUIREMENTS

The changing trends in agriculture are already making the data requirements more difficult to define because of the complexity of the issues driving each one. The discussion on data requirements will focus on two categories that require information for decision making: Marketing and market planning, and public policy, and investment. What will become clear is that the data needs to support a world market are significantly different from those for public policy and investing. Data to support the world markets are needed at the national level while the other data requirements demand information down to the local level.

- 3.1** **Marketing and Market Planning** The ability to genetically engineer a crop or livestock variety or specie specifically for a unique purpose will result in more individual products, each with its own independent market. Today, we think of a single corn or soybean market. In the future, we will see a market for high oil corn, corn for sweetening, and corn with various feed and milling characteristics. Each of these products will have its own market. These different corn products will be in competition for the corn producing land, but because of the different uses, there will be an increasing need for more detailed information about production by marketing classes. This issue could be influenced by the amounts produced under contract and moving through the marketing chain independently of the open markets.

Forecasts of future supplies for a nation or production region crossing national boundaries will be as important as historic information at local levels. This runs counter to the

strategy used by most statistical organizations that create statistics from the bottom up. Regional and local data may be of secondary importance for efficient world markets.

- 3.2 **Public Policy and Investment Data Requirements** The increasing role of governments in environmental and food safety issues will increase the need for spatial data. Spatial data can be considered to be small area statistics that follow geographic or transportation boundaries rather than political boundaries.

The industrialization of agriculture with contractual alliances between the different entities in the food chain will make it increasingly difficult to provide the traditional measures that describe agriculture for policy purposes. For example, it will be difficult to determine a farm gate price of a commodity that was grown under contract with the payment to be determined by the value of the end product. Traditional measures of farm income will be difficult to define as production inputs at the farm level are supplied by the contracting firm, and the value of the commodity determined only after it has been processed and distributed to the consumer. The income to the farm operator only represents the marginal cost of the service provided rather than the value of the product produced minus expenses.

Demographic statistics about agriculture and measurements of structure will continue to be important. While there will be fewer commercial farming units, their operating structure will be more difficult to uniquely define for statistical sampling and reporting purposes. It will be difficult to allocate costs of production and value of production to unique farming units. In addition, these farming units will be operated by many people that will require a new definition of what is a "farm operator". The current definition assigns one person to each farm for a 1-1 relationship, where in reality, large partnership and corporate farms have many people sharing in the management responsibilities and the income.

Public policy will require more detailed spatial and local statistics on land use, demographics by size and type of farm and enterprise and on farm and off farm income of farm operator households.

4.0 **STRATEGY TO MEET REQUIREMENTS**


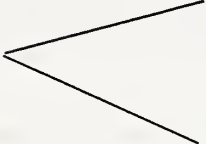
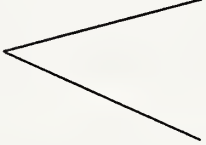
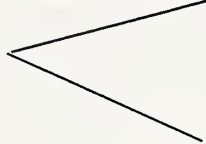
The following criteria will be used to define the future needs for agricultural statistics.

- 4.1 **Content** This involves simply defining the different commodities, agricultural inputs and demographic and environmental variables. NASS has a stated goal that at least annual estimates of production be provided so that 99% of U.S. cash receipts be measured. The content of the entire program will be open for review during the next several months.
- 4.2 **Scope** Closely associated with the content is the level of detail required for each item in the estimating program. For example, corn, as a major commodity, will be in the estimating program. The question is, will estimates be required for different market classes such as feed, oil, and sweetener? The need for wheat data by market class is already here. It will also be necessary to review the class data required for livestock. The

breakdowns for cattle and hogs will need to be reviewed to determine if they are still relevant. Genetic engineering will raise many questions about scope.

- 4.3 **Coverage** This is an important variable because resources always need to be considered. Coverage can be a geographic issue if the issue is whether to produce numbers that are National only, for National and major State, or for all States and counties. Another way to look at coverage is commercial production vs. all production. Should more data series be like the *Cattle on Feed* report that only includes operations with 1,000+ head monthly and all operations semi annually? Should we measure hog inventories the same way? Should coverage and scope reduced to provide monthly estimates of pig crop from the largest operations rather than complete coverage on a quarterly basis? Similar questions can be asked about several data series.
- 4.4 **Frequency** The frequency for which data items will be available is related to both resources and the characteristics of the item being measured. Frequency requirements are affected by the volatility of the item being measured and the main use of the data. In order to provide detailed geographic and spatial data, consideration will be given to reducing the frequency of some data items.
- 4.5 **Timeliness** This is a measure of the time between the data reference period and the issuance of the data. Crop forecasts issued around the 12th of the month are based on data collected around the 1st. The forecasts could be made several days earlier if U.S. level forecasts were prepared.

Examples of Criteria to be Considered

Scope		Variety Breed Market Class Production Class
Coverage		National Major State All States Counties Commercial vs. All Farms
Frequency		Weekly Monthly Quarterly Annual Biannual Quinquennial
Timeliness		Immediate 1 Week 1 Month 1 Year

With the census capabilities, NASS is planning a data system that will be driven by different needs and methodologies rather than one size fits all. In order to supply the market sensitive information on a timely basis, national level sample surveys will measure the different components of stocks and provide the forecasts of production for major States and the U.S. These national level sample designs will focus on production regions. They will be optimally designed to provide estimates of major commodities by market class.

On the other hand, much more detailed information will be required for public policy and investment purposes. Fortunately, this information will not be needed as frequently nor as timely. This speaks to the design of annual multi purpose surveys or annual sample censuses followed by periodic complete censuses which will depend on the use of a business register of farms.

5.0 ISSUES

NASS fully intends to provide census results in 2002 that paint a complete picture of the Nation's agriculture, its operations, and its operators at county and other geographic levels. There are some serious content issues that need to be addressed not only for the 2002 census, but for the intervening years.

NASS intends to implement an annual sample census for years between census periods. The intent is to provide an annual measure of production for 99% of the Nation's agriculture with county data for core commodities such as corn, soybeans, wheat, cotton, hay, cattle, and hogs. This annual program will provide more information about demographics and structure that is now only available once every 5 years. This program will also provide additional detail about varietal and production classes that may not be available from within-year reports.

NASS will continue the within year program of monthly and quarterly reports. The intent is for all of these reports to contain National totals, individual estimates for major States and the remaining grouped into an "all other" category. Data for States in the "all other" category will be provided annually.

This program review will raise more issues than can be presented in this paper. However some examples follow.

- **Contract Arrangements.** Hog and poultry inventory production estimates are made by collecting data from the contractor rather than going to individual contractees. However, the census approach is to collect data from the individual contractee. The dilemma is not so much as how to count the animals or birds, but how to measure income, expenses, and other demographic information. What information is needed about contractors, what is needed about contractees? Crop Production is moving in the same direction, so the problem will become bigger. Is the contractee a farm operator or a service worker? What demographic information is needed about contractees - contractors?
- **Demographic Measures.** The census provides an overall picture of agricultural operations by connecting ownership to production, income, expenses and operator characteristics. What are the core items that must be captured this way vs. using a single purpose sample survey? Is the information for all items needed down to the county level? The reason for asking these questions is that there is a growing need for more detailed economic and environmental information. Sampling can be used in the census to spread out the reporting burden; however, county level information may not be available as a result.
- **Coverage and Scope.** There is a growing interest in having crop forecasts by production class. Using wheat as an example, what is most important; winter wheat forecasts by state, or regional winter wheat forecasts by class such as hard, soft, or white wheat? For livestock, what will be most important in the future; monthly estimates of breeding animals and pig crop for commercial operations or quarterly inventory estimates for all operations?
- **Income Measures.** There is a growing demand for measures of farm household income

both from the farm and also off-farm sources. These questions are considered invasive by many and not answered. Australia which has a mandatory reporting system in place, attempted to add such income questions a few years ago. It caused such a public outcry, that the questions were dropped. Panel approaches can be used to obtain such information but this will not provide estimates down to the county level.

6.0 CHALLENGES FOR THE FUTURE

The transfer of the Census of Agriculture to NASS provides a unique opportunity to integrate census and survey based data systems.

This opportunity poses several challenges for the future.

- The integration of the census data system with the annual data system will need to adjust to the trends affecting agriculture. This means some data series need to change, others eliminated, new ones started.
- The difficulty will be identifying trends and associated data needs soon enough to measure what is relevant, but not too soon to waste resources on irrelevant trends, or start too late to develop a meaningful data series.
- Considerable attention will need to be paid to phasing in the new as the old is phased out. Data users will need to help us decide how long these phase-in periods need to be.

Another challenge is that there is an insatiable demand for data. As the farm population shrinks, there are fewer operations to share the reporting burden. Good public policy decisions about agriculture require more detailed information about farm household income and expenses than many farmers are willing to share. New data sources and use of record keeping systems will need to be explored to minimize the reporting burden on farm operators.

A final challenge will be to keep the lines of communication open between the data users, data providers and the data preparers to ensure sound information is available for marketing and policy decision making.

Ag Stats -- The Census & Beyond

Data User Perspective



Main Points

- We are in information age where access to information is critical
- Ag census integration with NASS great move
- Thanks for making data available faster, better, cheaper
- Still, need to make info more user friendly



Caveats & Confessions

- **One of your best customers -- and worst nightmares**
- **Intensive ag data user -- every day for decades**
- **Intensive data generator**
- **Member of Census Advisory committee**
- **Timely approximations better than delayed precision**
- **Believe stats important to future of ag**



We are in information age where access to information is critical

- **Rapid change**
 - **Reduces useful life**
 - **Increases value**
 - **Requires conceptual updates**
- **Information crucial to maintaining independent farmer**
- **Biased information or thin information can lead to wrong decisions**
- **Need to check for validity -- e.g. hog marketings in Nov. & Dec.**



Ag census integration with NASS great move

- Lessens frustration with different definitions
- Permits cross-checking with other sources
- Have greater ag expertise
- Have greater interest and commitment
- Uses USDA field resources
- Earlier release of results



Great strides by USDA in faster, better, cheaper data

- You have come a long way from day of mailed reports
- Electronic release on Internet is great
- Providing easier selection of data and dates -- e.g. new NASS database
- Release on Internet provides instant access around the planet at affordable (free) price



Still, need to make info more user friendly

- Too many series still titled Table XX, have to search for which table to use
- Data not combined -- split into tiny files with few years (Try doing a 100 year analysis!)
- Have to parse data -- time consuming
- When parse must recombine due to spaces between digits
- Too many files not kept up to date



Still, need to make info more user friendly *(continued)*

- Inconsistent sorting by alphabet rather than by number
- Data left to speak for themselves -- little interpretation
- No adjustments for inflation exaggerates some results (\$1,000 today not same as 1992 may increase number of farms)
- Acrobat files good for printing but not for analysis



Defining future needs -- criteria

Different for marketing than policy & investment

- **Scope -- variety, breed, class??**
- **Coverage --national, major states, commercial??**
- **Frequency -- weekly, monthly, quarterly, annual, 5 years, 10 years??**
- **Timeliness -- immediate, 1 week, 1 month, 1 year ??**
- **Fundamentally -- net public benefit**



Challenges for future

- **Getting respondent cooperation & maintaining credibility**
- **Disclosure problems**
- **Free on Internet reduces publication revenue**
- **If reduce printed copies, cost per copy rises**
- **Walk in the users' moccasins**
- **Faster, better, cheaper**



Challenges for future (*continued*)

*

- Accurate info in thin markets and small counties
- Linking data to Geo. coordinates
- Using "hits" to set priorities
- Keeping up with GMO -- not just Number 2 yellow corn
- Allow user to cross tabulate
- More meaningful PUFs
- Tacking contracting & integration



VALUE ADDED: COOPERATIVES AND COMMUNITIES WORKING TOGETHER

Francis L. Buschette
Chairman, Co-op County Farmers Elevator

Good afternoon! I am pleased to be here today to share some thoughts and personal experiences of value added agriculture in Renville, Minnesota.

Let me begin by telling you about my farming operation and my philosophy about value added cooperatives. Growing up, I saw my parents add value to their crops raised on their 160-acre farm by using most of their crop production as feed for 12 dairy cows, 10 sows and 200 laying hens. They would sell the produce and meat from this, as their value added income. As farming changed and I started farming in 1960, our farm grew and today we farm 1,300 acres. We raise corn, soybeans, sugar beets and wheat. This doesn't allow the time and resources required to take care of livestock in addition to the marketing, production, repairs, planning, and the new technology of Global Positioning Systems in crop production.

Renville has the unique title of *The Cooperative Capital of the United States*. We are a community of 1,300 people and have nine cooperatives. These cooperatives are both traditional and New Generation Cooperatives. I will explain the difference later.

Presently our family is involved in the Southern Minnesota Sugar Beet Cooperative that produces sugar; Minnesota Corn Processes that produces ethanol and corn sweeteners, Golden Oval, producing liquid eggs, ValAdCo that produces pork, MinAqua Fisheries, producing a fish called Tilapia. These cooperatives are not the traditional cooperatives to which one could belong by buying a product or selling a commodity. These cooperatives are known by a variety of titles including New Generation cooperatives, New Wave Cooperatives and Value Added Cooperatives.

I believe that these cooperatives make our farm operation not unlike what I grew up with as a child by adding value to the different crops that we produce today. We have done this through the purchase of shares and the right and obligation to deliver a crop to the cooperative.

Midwest Investors, Inc. started as a new laying hen operation in 1994. First, the City of Renville annexed 320 acres into the city limits of which Midwest Investors owned 80 acres. This allowed the city to provide Tax Increment Financing and a low interest bond to the cooperative. This was a big boost when the new cooperative moved forward to get a loan from the St. Paul Bank for Cooperatives.

Today, Golden Oval Eggs, a subsidiary of Midwest Investors has two million laying hens and an egg breaking plant. Golden Oval sales in 1998 were in excess of 22 million dollars. There are 80 employees working in the barns, the breaking plant, and the office.

Many of these people live in the Renville area and make their purchases there as well. Most employees are younger and have children in local schools and attend community churches. The cost of the 16 laying barns and egg breaking plant was more than \$20 million, an investment that returns a substantial tax benefit to the city.

As the egg laying cooperative was starting, ValAdCo was also growing and the need for a new efficient feed mill became apparent. Co-op Country Farmers Elevator, a supply and grain purchasing Cooperative, Golden Oval, and ValAdCo a 10,000 sow cooperative joint ventured in building a state of the art feed mill. Again, the City came to the assistance and provided TIF and a low interest bond. Today, this cooperative, known as United Mills employs 12 year round people. This mill now grinds more than 70,000 bushels of corn per month or 77 unit trains with 54 hopper cars each year. This corn earns an added value in cash which is spent locally.

How did value added cooperatives begin?

In the early 1970s, Crystal Sugar, a privately owned sugar company closed its processing plants in Chaska, Minnesota and Mason City, Iowa because of environmental issues and obsolete facilities. Former Crystal producers in Renville County worked together to form the first cooperatively owned sugar processing plant in the United States. After much difficulty in obtaining financing for a loan to build the plant, the operation began in 1975. This was the first New Generation cooperative in our area, and we didn't realize this until several years later. Growers had to purchase shares of stock which gave them the right and obligation to produce one acre of sugar beets for each share purchased, and deliver that product to the processing plant.

Risks involved in starting a Value Added Project

Organizers must be certain that there is a market for the product to be produced as well as a profit in doing so.

It is important to establish a solid foundation with a solid equity. We have come to believe that the equity required to start a new cooperative should be no less than 50%. This serves to protect for unknowns that always seem to come along. For example, if a family should decide to remodel their home and the estimated cost is \$50,000, the final cost is frequently \$65,000 - \$70,000. Been there, done that! Bankers frown when new cooperatives fall below 30% to 35% equity.

Finding a top notch manager or CEO is the most important decision a board will make and such a manager or CEO will be expensive. It isn't easy for a group of crop producers to pay someone a salary which is much larger than they earn on their own farms! Don't be afraid of paying a good salary for an effective CEO. This may be the best investment a cooperative makes.

There are a number of positions of responsibility in operating a value added operation. Care must be taken by the board to make certain that decisions are made by people who have the expertise to do their job well. When shares were being offered in our community, one nay-

sayer suggested that nobody locally was smart enough to manage a laying hen operation. Golden Oval hired the former owner of a laying hen operation in Iowa as production manager who does an outstanding job. Some times employees come from out of the area, and at times key employees are local people who have proven themselves.

Risks in not being involved in a value added cooperative

A great risk is to lose the profit that could be made by working together and moving "up the food chain." In Renville, located two hours west of the twin cities, the basis on corn is 45 cents under CBOT.

The value of shares is connected to success of the cooperative. If a cooperative is doing well, share value increases, and if doing poorly, the shares decrease in value similar to investments in the stock market.

Local communities either ignored or opposed early value added cooperatives. They did not understand and appreciate the role of value added cooperatives in economic development. That has changed considerably and nonfarm business enterprises understand the value of cooperation in the farming community and include these members in community development discussions. There is a new viewpoint in the community, as some new employees are from different areas of Minnesota and the United States, and bring in new perspectives. Renville is no longer a closed community.

In the case of Renville, a community of approximately 1300 people, since 1992, approximately 170 direct jobs within the new cooperatives have been created. These numbers do not include supporting jobs that are not easily identifiable, such as labor for additional fuel delivery, repairs, and electricians, etc. Statistical reports tell us that for every ten new job positions one new supporting job is created. Renville is one of the few area communities in which every building located on Main Street is occupied. Local comments are that new employees buy cars and purchase groceries and supplies from the local stores.

With larger farms and a decreased population, there is a potential of the loss of community organizations. There has been a decrease in the membership of Renville County churches due to decreases in the general population. However, in the Renville area, many churches are experiencing growth due to the employees hired by value added cooperatives. In the past, nearly all of the young people completed their high school education and then left the area. Today, the New Generation Cooperatives offer opportunities for employment in a wide range of jobs, including managerial positions. One of the biggest concerns in our community is the shortage of a labor force. There is employment available for anyone who is willing to work.

There is risk in doing nothing. A young farmer from North Dakota said he is shifting investment from land and machinery to investments in New Generation cooperatives. He said if the venture fails, you lose the cash, but a bigger gamble is staying with the status quo. He ends his talk by saying doing nothing has always been a sure way to go broke. That goes for communities as well.

In summary, I would like to leave a message with you. There is a crisis in farm country. There will be several farmers that will not qualify for operating loans this year. This is not because of poor management, but because we have encountered the lowest prices farmers have been paid in decades. We do need to add value to the commodities we produce and bring them up the food chain to the consumers. We can and will produce the quality and quantity of products the consumer demands. Because of the farm crisis, new ventures will need considerable help. I believe a major help would be through low interest loans. When new projects get their necessary loans in place, they usually have a very high rate of interest. This causes the new venture to begin with a huge debt before any products are marketed. When rural electric came to the country, cooperatives received loans at a discounted rate, and this helped jump-start these cooperatives. If New Generation Cooperatives could start at 2% or 3% interest rather than 9% or 10%, this would certainly help. The loans could even have a sunset after five or seven years.

I believe that value is added to both the cooperative member and to the local community when they work together.

FORMING A VALUE ADDED COOPERATIVE

Michael Warner

Chairman of the Board United Spring Wheat Processors
and Member of the Board of Directors of Dakota Growers Pasta Company

First, I would like to thank you for this opportunity to visit with you about my favorite subject.....Value Added Agriculture. It has become one of the hottest topics in agriculture, and from my perspective it should be. Hopefully, in some small way I can remove some of the confusion and add to the enthusiasm for what I think is the next historic step in the evolution of the greatest food production system in history. That is projecting production agriculture up into the food chain to process and market raw commodities in a highly efficient and seamless business system. The end result is greater value and quality for consumers and increased profits for the producer.

What These Cooperatives “Are” and “Are Not”

To get started today, I think we should make it perfectly clear what these cooperatives are and are not. They are not another version of the service cooperatives we are all so familiar with. Their job is to provide the farmer/rancher with goods and services like oil, fertilizer, fuel, feed, electricity and a market for our raw commodity. Their goal is to deliver these goods and services as cheaply and efficiently as possible. Traditionally, we don't look to them as any source of big cash income to our farms and ranches. They tend to retain most of their profits to make capital improvements and do their job better. So, they use the familiar formula of 80% retained earning and 20% cash.

The value added cooperative's main job is to make as big a profit as it can and send you the check in the mail, which you can then spend as you see fit. You will make a significant investment in shares of the company, and these shares represent a “RIGHT AND OBLIGATION” to deliver a certain number of units of production to the cooperative, such as bushels, tons, animals or pounds. There is a limited number of shares issued and these shares can be bought and sold between farmers. So, they can and do appreciate in value, depending upon the level of profits. These profits are paid out on a per share basis predominantly in cash with minimum amount retained. Therefore, they not only give you profits each year, but they also go on your farm and ranch balance sheet. In the successful value added cooperatives, the value of these shares can become one of the single greatest sources of growth in the asset base of the farmer/rancher who is involved.

Credibility Is the Most Precious Commodity for Success

Over the years I have been involved in several of these efforts. There have been some useful refinements, but they tend to progress in pretty much the same manner. There is a lot of specific and technical information about what exactly you have to do that are legal and financial requirements. However, they are just that.....requirements. There is also a natural progression

of events or steps, if you will, but they are for another program. What I want to talk to you about are the “Real Reasons” you get a successful business started. They basically boil down to answering two fundamental and simple questions for the potential investor.

1. Does this make sense?
2. Who am I doing business with?

We could spend some time here talking about cooperative structure, what you do first, second and third, but all that can be retrieved quite easily from cooperative law firms and others. These are the two things that really make the venture go or not go. As simple as they sound, these questions contain a multitude of issues that must be resolved if you are to be successful. If you don't answer these questions to the satisfaction of yourself and other potential members; you aren't going anywhere. By answering these two questions properly you take ownership of the most precious commodity you will need for success and that is “Credibility”.

You must remember, you need these other investors to help get the business going. Its for the oldest reason in the world for people to come together and pool their resources. They can't do it themselves. In order to get their help, you must know your stuff. You must be able to answer all questions, and answer them right. If you ever look like you don't know what you are talking about or heaven forbid, you appear to be lying; you will lose all credibility in a single moment and then you are lost.

Credibility Question #1: Does This Make Sense?

At the inception of United Spring Wheat Processors, we were actually starting cooperative, where its only business was to find a business that would add value to spring wheat. Talk about making sense. When our potential member/investors first sat down at one of our meetings, we were asked many similar questions, and here are some of the answers.

Q: What are you going to make?.....A: Something out of spring wheat.

Q: What will that be?.....A: We don't know.

Q: Where will you locate a plant?.....A: We don't know.

Q: How much money can we make?....A: We are not sure.

Q: How much to invest?.....A: We don't really know that either

Of course, I am being facetious. What we really said was this.

“We see other people in our region, like sugarbeet and durum growers, making good profits by adding value to those crops. We think it is time for spring wheat, the number one crop of our region, to do the same thing. To do that we have a plan we think will work, if you will help.”

So, we proceeded to tell potential investor/farmers in four states through over 100 meetings, what we thought “Made Sense”.

You Need Help

We said we didn't think we, as farmers, were competent to form a business to add value to spring wheat on our own. We planned to hire people to help us do that. When you think about it, the trick to starting any business does not hinge on what you know, but knowing what you don't know. Then proceeding to find the answers. Our intentions were to conduct a nation wide search to find a CEO. This person had to have experience in the spring wheat industry, and could help us form the business. He would know who we had to hire and what we had to do. We wanted him to be well known in the industry and particularly by the customers for our products made from spring wheat. Why did we want this? To add "Credibility" to our effort. In the end, we hired Mr. Gary Lee. He was the VP of Dry Milling Worldwide for Cargill, and also had been an internal strategic planner for Cargill.

Business Plan Must Be Customer Driven

We then told the potential investor/member that we believed this business must be designed from the end customer back to our fields. The customer was the best source of telling us what to build, where to build and how to run our business. Many value added cooperatives have been started as an economic development effort. The idea is to build a plant somewhere in your state or region and generate some jobs. If you do that without finding out where the customers are, who the competition is and how you can provide products efficiently and competitively; how can you hope to be successful. All too often the predominant marketing strategy in value added cooperatives is a "build it and they will come" market plan. This is one of the reasons many have failed.

The truth is the building of a plant is the easy part, and it is nice for the town that gets it. Often the location has something to do with where certain board members live. However, it only directly benefits about a 30 to 50 mile circle around the plant with any real impact. If you are not from that town, what do you get out of it? These business must be driven by customers needs, not the economic development department of you county or state, or it will fail. Another truth is that the best economic development in rural America is profitable farmers and ranchers with strong balance sheets using and improving the infrastructure that already exists.

So, we pledged to our potential members that the only criteria we had for building a plant or plants was that they would go where they had the best chance of making some money. In fact, our first plant is currently under construction in Macdonough, Georgia. It will be making frozen dough and frozen partially baked specialty and crusty breads. Keep in mind all our members are in North Dakota, Minnesota, South Dakota and Montana.

This Takes A Lot of Money

After explaining our plan, which essentially was starting a business to find and create a business; we told our potential members that we thought this would take a lot of money. Our best estimate was around \$1 million to hire the competent people and do the business planning. Improper capitalization is also a common trap for start up businesses.

One of the myths we enjoy in America is personified in the old Horatio Alger stories. You know the ones.....honest young man of pure heart and a dollar in his pocket is destined to become a millionaire through hard work and perseverance. In rural America, we particularly like that myth. We all want to believe we can start these business on the cheap. You know, start small,

maybe even very small, and grow the business. We kind of believe we can go into a prospective customer and be taken seriously by saying something like this.

“Hello, we are a bunch of farmers, and we would like to make something out of our commodity. We in turn would like you to buy it. Now, we don’t know how to make it. We don’t have anybody hired who knows how to make it. We don’t have a plant to make it with. In fact, we don’t even have any money. Now, knowing all that, would you be interested in buying something from us?”

We then asked our potential members, who are pretty big buyers in their own right, if they would buy anything from a person like that. Every business has a critical mass in terms of size and production capability. If you are not that size to begin with, you will fail. This is something farmers actually instinctively know, but they still like the idea of those Henry Ford/ Horatio Alger...start small success stories.

We then told our potential members that in order to do the analysis we thought we needed to do to start the business, have credibility with the people we wanted to hire and credibility with our potential customers; we needed to get some serious money together. We then proposed what was essentially an installment pay plan to cooperative formation and membership.

First, we asked for what we called “Seed Money” of \$200 per potential member. We would use this money to start the analysis of our industry, and to conduct a search to hire our CEO. This would give each potential member the right to take membership in the cooperative, once we got it formed. At the same time we asked for the seed money, we told them we would be coming back for more money later. We called this money “Credibility Money”. This money would be put in an escrow account in their name, and they would then become members of the cooperative. We could not spend this money in escrow, but we could use the interest income generated by these funds to continue the business planning and formation.

We felt, and the potential members agreed, that a significant show of money would give us credibility with a lot of people that were going to be very important to the success of the business. Customers: We wanted to be able to go into prospective customers, whose information and interest we very much needed, and say something like this instead.

“Hello, we are a group of farmers that intend to make a spring wheat based product. We would like you to consider being our customer. In order to prove that we are serious about this, we have hired our CEO, and you know him and his reputation. We have amassed \$15 million dollars to start the business, and we intend to collect significantly more than that from our members when our business plan is complete.”

We also needed credibility with the banking community. Not only to finance the business, but also to provide our members with financing to buy the stock. We needed credibility with the additional people we would hire to form and operate the business. They needed to see a well capitalized business for them to make a move to work for us. Finally, we needed some credibility with ourselves as members. We needed to know that each of us were committed enough to the

idea of adding value to spring wheat that 2850 of us were willing to put up at least \$4,800 to start the business.

Finally, we told the membership that we would come back with a complete strategic business plan. They could then take a final look. If they liked the plan, they could convert the \$4,800 in the escrow account to stock in the cooperative. In fact, we promised them an opportunity to invest more than that, if they wished.

All of this “Made Sense” to 2850 spring wheat farmers in Minnesota, North & South Dakota and Montana. In the end, they amassed over \$25 million to start the company. It made sense to them, because we stayed centered on some simple truths that all the members knew, and that maintained that “Credibility”. Truths like, “it takes money to make money”. They realized that they could not do it alone, and they needed to cooperate with each other to get what they wanted.

They also realized there was a “Catch 22” in the proposition, unless they bought into the concept. If they wanted to wait and see if the deal was a good one, there wouldn’t be any money available to develop the deal in the first place. They realized they had to decide now, at the beginning, whether they were in or out, if they really wanted to add value to spring wheat. They were not going to get to wait for all the money to be spent and the work to be all done, and then have someone come by and beg them to invest.

Credibility Question #2: Who Am I Doing Business With?

For me personally, this is the more important question of the two proposed. When USWP went about organizing its steering committee, we had two criteria for those that became members. #1: They had experience in the formation of a value added cooperative. #2: They had strong expertise in the spring wheat business. In some cases, we got both in one person. The choice of these people and the signing on of their support was the single most important asset of the whole effort.

Think about it. If you don’t know anybody involved in a proposition; are you going to invest in it? We all are going to ask ourselves many questions. Can I trust these people? What is in it for them? How is their track record on their business judgment? What is it about these particular people, that should make me want to put my hard earned money in their hands? These are all fair questions.

On the USWP steering committee we had exclusively farmers, and they filled the criteria for being members quite well. We had three previous members of the American Crystal Sugar Cooperative Board of Directors. They each had over 20 years of experience in being part of a value added cooperative with over \$600 million in sales. This group included a past chairman of the board. We had several members of the board of directors of Dakota Growers Pasta Company, as well as their chairman. Many of the members had owned stock and been members of the sugarbeet cooperatives for years, as well as Dakota Growers Pasta Company.

There were members on the steering committee from all four states wheat promotion commissions, wheat growers organizations, some current and past presidents from those groups, the immediate past president of the National Association of Wheat Growers and members and

officers past and present of some of the regions general farm organizations. That whole group consisted of 50 members of that caliber from across the four state region. We obviously made a concerted effort to get people involved that potential members either knew or knew of their reputation. We printed their resumes in our first brochures. We wanted to leave the potential members with a feeling that "If this group couldn't do it.....who could?"

To further validate our position we did a few extra things. We took no per diem, and the executive committee of the steering committee were the only ones that got mileage, meals or lodging. This re-enforced the idea that we were truly committed. We held a composite of over 100 meetings across the region. That is a lot of work, and the members knew and appreciated it. These are all elements of rural America's tradition of "Barn Raising", showing a willingness to donate time and resources for the good of the greater group. The real truth is, we were just doing what so many have done in the past when they wanted to start a business. If they couldn't do it on their own, they asked for help.

Conclusion

This is how we went about answering those two very important questions. If you decide to get involved in value added, they are the same fundamental questions you must ask yourself and eventually answer to many other people.

Does this make sense?

Who am I doing business with?

Starting these businesses is not an academic exercise, although information is very important. You can plan and analyze till the cows come home, but success or failure is embodied in these two simple questions. Business people know that instinctively.

In the case of USWP, these two question were answered by conducting a first class and rather expensive sales effort. We enlisted the best we could find of legal counsel to help take care of all legal matters, consultants to do the business planning, financial experts to prepare the financial projections and a very farmer specific and talented group of public relations people. They helped to get the word out over four states, and provided computer generated presentation material, proper sound and other visuals.

We also had an important educational edge in our region, and this was an important advantage to our efforts. Many of these cooperatives have been started. Some have been glowing successes. Others have been abysmal failures. Success or failure, they have made the farmer/ranchers of the upper Midwest very familiar with value added cooperatives. In general, people will not do what they don't understand. So, part of "Making Sense" is to understand the fundamentals, and that really is an education process. Isn't that what this meeting is about?

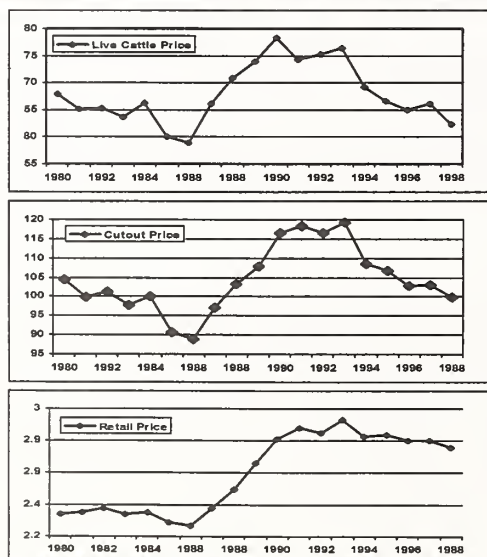
For those efforts, I applaud the organizers of these very educational outlook conferences and thank you for the opportunity to contribute.

Beef Industry Vision Statement

A dynamic and profitable industry
which concentrates resources around a
unified plan, consistently meets
consumer needs and increases demand.

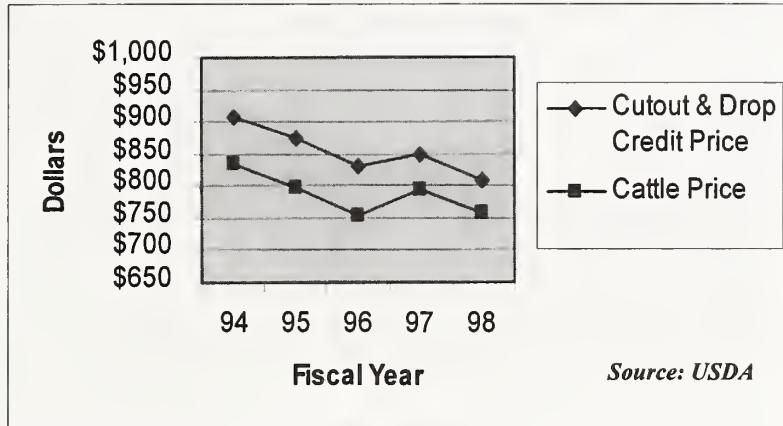


Who is making the money?

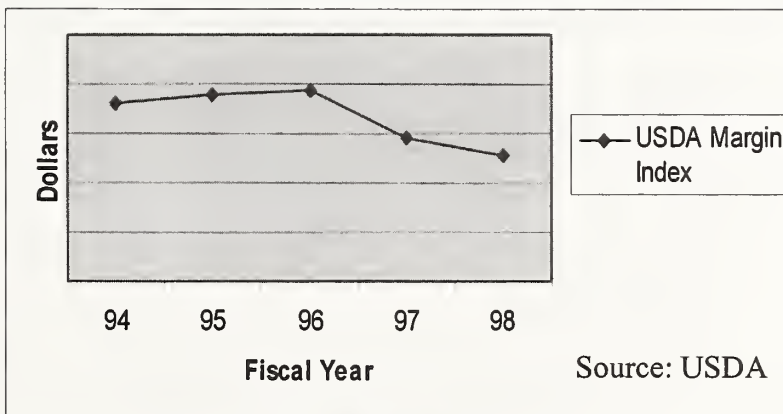


Source: USDA

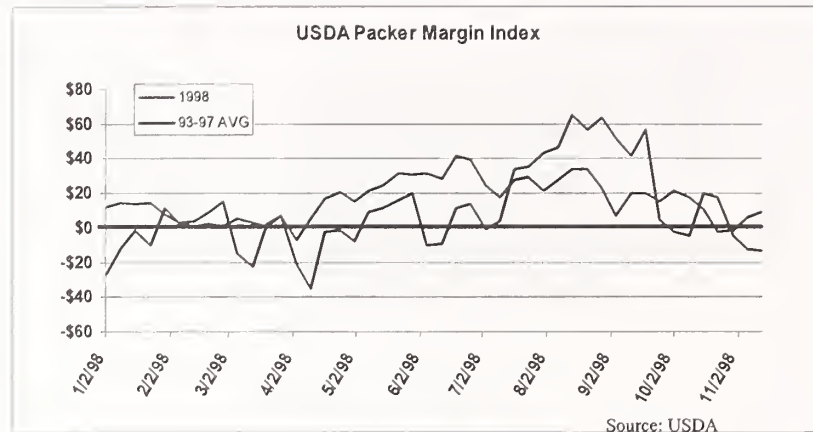
Cutout + Drop Vs. Cattle Price



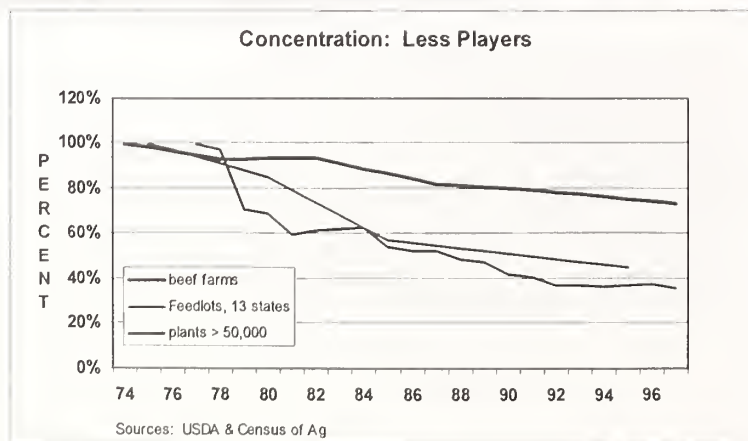
USDA Gross Packer Margins



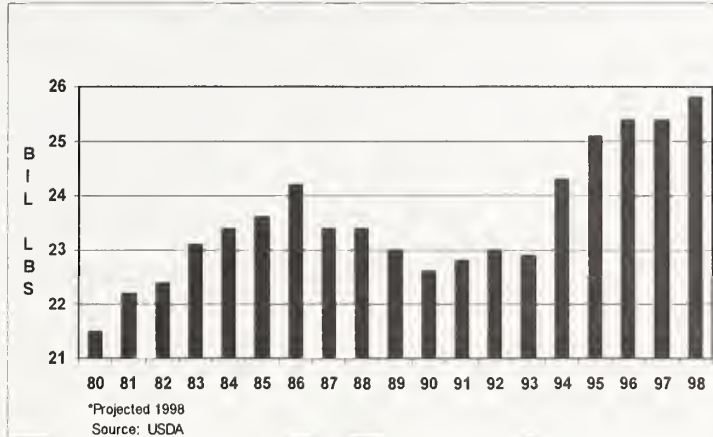
USDA Weekly Packer Margin Index



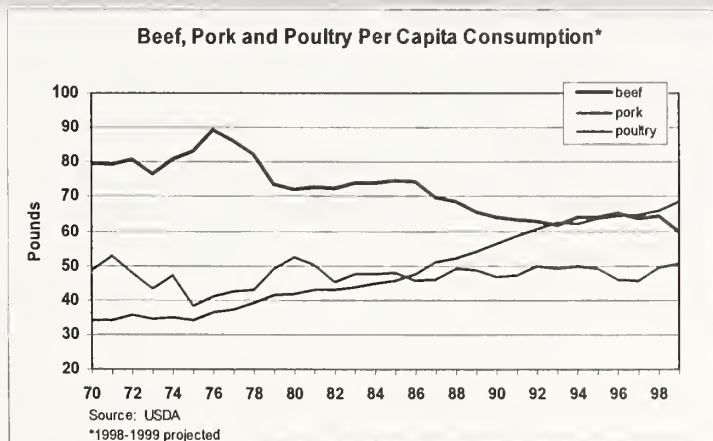
Industry Concentration



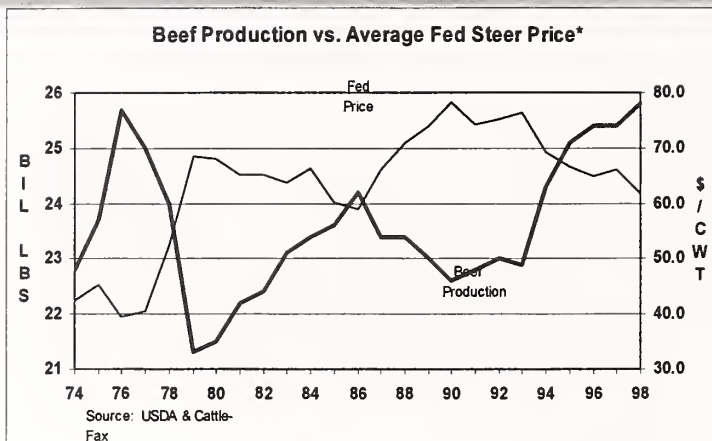
Beef Production



Consumption



Production vs. Price



Summary of Facts

- ◆ Captive Supply
- ◆ Abundant Supplies
- ◆ Flat Demand
- ◆ Increased Competition
 - Efficiency
 - Effectiveness



Keys to Achieve Mission

- ◆ Value Based Pricing
- ◆ Carcass Information
- ◆ Ownership
 - ☐ Full value
 - ☐ Value-added products



USPB Mission Statement

- ◆ "To increase the quality of beef and long-term profitability of cattle producers by creating a fully integrated producer-owned beef processing system that is a global supplier of high quality value-added beef products responsive to consumer desires."



USPB Program

- ◆ Own Farmland National Beef Packing Co.
- ◆ Equal Governance
- ◆ One time cost of \$55 per head (\$7/yr.)
- ◆ Deliver/Processing Commitment
- ◆ Industry Leading Grid
- ◆ Carcass Data

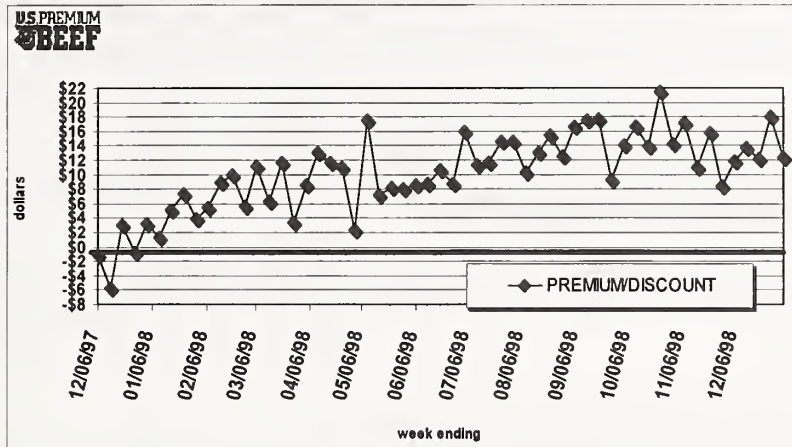


USPB Results

- ◆ Began Operations on December 1, 1997
- ◆ Delivered 500,000 cattle
- ◆ Averaged 8,500 cattle / week
- ◆ \$4.5 million in premiums over cash YTD
- ◆ \$9.00 average premium over cash
- ◆ \$29 top 25% ave. premium
- ◆ USPB Year-end earnings of \$3.9 million
- ◆ USPB earnings of \$12 per head
- ◆ Ave. ROI of 37.5%



USPB Average Weekly Premiums



U.S. PREMIUM
BEEF

USPB Single Week Performance

USPB SORTED BY PREMIUM
10/27/98

lot#	Head	Sex	Yield	Prime	Choice +	CAB	Ungraded	yg1	yg2	yg3	yg4	yg5	light	heavy	PREMIUM
360	116	S	63.85	20.59	88.98	33.6	0.79	4.95	35.28	59.77	0	0	0.00	3.20	\$ 61.36
403	52	H	65.59	2.13	79.09	23.38	0	3.71	76.36	18.2	1.73	0	0.00	0.00	\$ 59.30
404	52	H	65.38	4.4	77.03	22.74	1.9	0	76.61	23.39	0	0	0.00	0.00	\$ 57.53
262	211	H	65.85	2.9	62.43	8.64	4.17	11.48	47.32	38.35	2.85	0	0.00	0.00	\$ 48.19
102	51	S	65.02	0	74.8	6.15	1.91	1.91	64.67	31.2	2.22	0	0.00	0.00	\$ 46.84
562	132	H	65.11	8.63	82.11	16.19	1.37	2.18	32.24	51.52	14.06	0	0.00	5.24	\$ 46.28
165	127	H	64.16	7.1	80.56	11.32	0.75	1.45	41.82	51.88	4.85	0	0.00	0.00	\$ 45.79
164	254	H	65.21	3.63	75.01	7.13	1.16	3.79	37.26	53.23	5.72	0	0.00	4.08	\$ 45.53
468	133	H	64.73	6.04	75.86	19.14	1.52	1.5	33.22	58.12	7.16	0	0.00	5.26	\$ 42.24
307	43	Mixed	63.08	11.83	90.62	0	0	18.01	70.26	11.73	0	0	0.00	2.98	\$ 37.77
664	60	H	64.9	1.63	72.14	9.45	3	7.51	25.16	62.61	4.72	0	0.00	0.00	\$ 36.00
668	30	Mixed	64.92	0	56.83	7.08	3.05	16.81	69.87	13.32	0	0	0.00	0.00	\$ 35.59
501	65	S	64.14	1.73	80.67	3.06	1.59	0	52.27	44.37	3.36	0	0.00	1.88	\$ 34.94
690	248	H	63.69	4.65	81.09	6.68	3.14	1.56	26.23	65.71	6.5	0	0.00	0.00	\$ 33.04
304	83	S	64.51	4.84	61.44	16.91	0	0	35.62	60.49	3.89	0	0.00	0.00	\$ 33.03
263	45	S	64.69	0	60.76	9.16	6.47	10.39	55.09	34.52	0	0	0.00	2.55	\$ 32.62
320	75	S	63.92	8.56	70.77	27.2	7.96	7.94	59.94	29.47	2.65	0	0.00	0.00	\$ 32.57
401	138	H	66	0	44.39	6.75	8.56	3.58	72.76	22	1.66	0	0.52	0.91	\$ 31.58
201	88	H	65.04	5.1	67.35	3.45	3.73	6.49	56.06	27.93	9.52	0	0.75	0.00	\$ 31.05
202	84	H	62.7	4.6	81.28	41.49	0.81	1.23	62.04	36.73	0	0	0.81	0.00	\$ 30.03
161	128	H	64.12	1.48	68.79	5.24	0	14.89	53.01	28.78	3.32	0	0.00	0.00	\$ 29.96
469	129	H	64.39	4.12	64.6	9.81	2.1	4.18	39.5	49.36	6.96	0	0.00	0.00	\$ 29.57
163	60	H	65.83	0	42.7	5.08	7.94	11.36	50.4	38.24	0	0	0.00	0.00	\$ 28.62
503	25	S	63.05	3.58	88.94	13.2	0	0	43.04	56.96	0	0	0.00	10.56	\$ 28.25
563	115	H	65.35	1.75	53.92	1.81	7.19	7.95	41.13	44.72	6.2	0	0.00	0.00	\$ 27.46
204	62	S	62.77	0	77.33	37	0	0	23.99	76.01	0	0	0.00	0.00	\$ 27.25
464	150	S	64.8	3.95	68.47	6.46	3.62	9.64	39.54	41.15	9.67	0	0.00	4.32	\$ 27.12

U.S. PREMIUM
BEEF

USPB Results (Cont.)

- ◆ Marketing Opportunities
- ◆ New Product Development
- ◆ Acquired KC Steaks



In Conclusion

- ◆ Move toward Coordination vs. Isolation
- ◆ Selling Meals vs. Cattle
- ◆ Explore Alternative Marketing
- ◆ Must Support Efforts to Develop Creative Solutions to the Problems



REMARKS BY REP. LYNN WOOLSEY

Before I became a member of congress, I raised four children. My most basic responsibilities in this role were to ensure that my children were raised with love and direction; were sheltered; clothed; and fed. If you think the job of a member of congress is tough, try mom of four... especially feeding an all-American football player (and his buddies).

Now, my family is grown up, and, I serve in congress. But, children teach parents lessons and one of these lessons remains always with me: children thrive when they come first.

When I was elected to the house, I told the democratic leadership that I wanted to serve on what is now the education and the workforce committee, because that is where the most important decisions concerning our children are made.

In my freshman year . . . when we were in the majority, I passed the coordinate to educate act, Title xi of the ESEA reauthorization. From experience I knew that the fragmented lives of many parents often times makes it impossible for them to attend to their children's needs. My bill made it possible for schools to bring health and social services to one convenient location -- the school site.

When the republicans took over the house in 1995, we had to fight their attempts to put all nutrition programs in welfare block grants, severely cutting funding, and placing our school lunch programs in jeopardy.

But we fought back, and we prevailed. The American people told the then new majority that school lunch programs were viewed as a fundamental part of our educational system. And, now, we're going to make school breakfast programs and after school programs equally as important.

Last year, congress inserted my provision to fund six pilot school breakfast programs into the child nutrition reauthorization act. Earlier this month, the president released his budget including \$13 million to fund these programs. My ultimate goal is, of course, to expand the school breakfast program to include all elementary school children .

School breakfast programs are too often categorized as "just another form of welfare." But the fact is that in this society where two working parents are the norm, breakfast programs are vitally important to working families at every income level.

Even in my relatively affluent district, too many kids eat a skimpy breakfast or miss it entirely because their parents are rushing out the door to beat the commute traffic.

So while we are looking at a variety of ways to improve schools -- the most obvious can escape

our attention. For we know that the greatest teachers, in the very best schools cannot teach a hungry child. And we know that children with growling stomachs, simply cannot learn.

All of us should look at breakfast programs in a different way. They are a learning tool, just like books and computers. They ensure that all of our children are ready to learn.

Studies reaffirm what we have known all along: kids who start the day with a good breakfast do better in school. In fact, two recently published studies show clearly that students who eat breakfast improve both their grades and their classroom behavior .

Last year I was also able to convince congress to expand eligibility for subsidized snacks at after school programs to teenagers aged 13 to 18.

No, I'm not advocating "twinkies for teens." The fact is, as the president has pointed out, the majority of juvenile crimes are committed after the school bell and before the dinner bell when parents return home from work.

If we are to prevent juvenile crime, alcohol and drug abuse, and teen pregnancies; if we are to give our kids positive things to do -- more after-school programs for adolescents are needed. And, snacks are a big part of any after-school program.

And there is more work to be done:

- we need to increase the reimbursement rates for the summer food and child and adult care food programs.
- we must restore start-up funds for school breakfast and summer food programs.
- coverage for a fourth meal for children who are in child care centers for long hours must be reinstated.
- and, low-income children in private child care centers should not be forgotten. They too must be made eligible for subsidized snacks and meals.

You know that I will continue to work until there are no more hungry children in our schools or child care centers.

Perhaps we need to update that old saying attributed to Napoleon, "an army travels on its stomach." So do our children. Children grow fit, learn better and lead healthier, happier lives -- and stay out of trouble -- when they eat good food.

The farmers of america have the means to feed every child in every home in the nation. The cost of such programs can easily be absorbed within our balanced budget framework -- in my mind, a few less b-2 bombers at \$1.2 billion each would easily pay the bill.

Basically, it's a question of priorities. As we head into the next century, I know that my priority will continue to be our children -- 25 percent of the population and 100 percent of our future.

When we make the lives of our children better -- through better nutrition, health, and education -- we are ensuring that our nation endures.

Thank you.

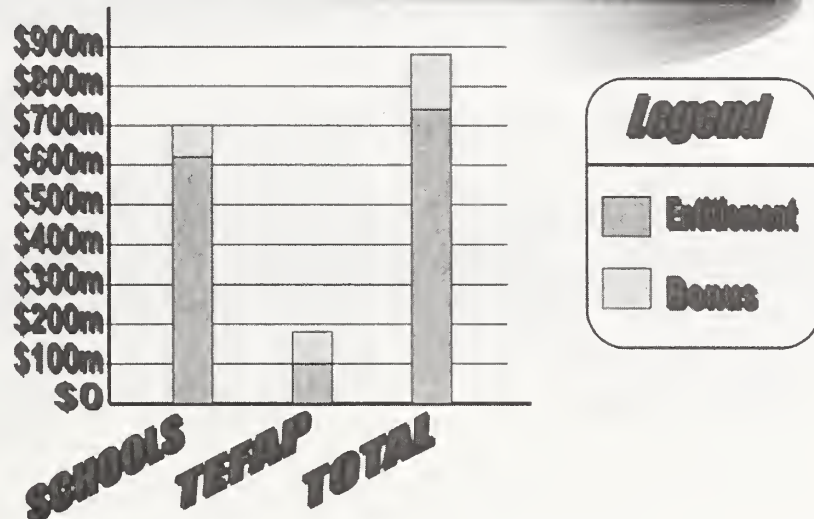
Rick Gresser, President, American Commodity Distribution Association and Manager, Food Distribution Services, Texas Department of Human Services

Schools as an Emerging Market and Bonus Commodities

"BONUS COMMODITIES"

- Definition of Bonus Commodities -
"Foods that are in extreme oversupply"

Value of USDA Commodities

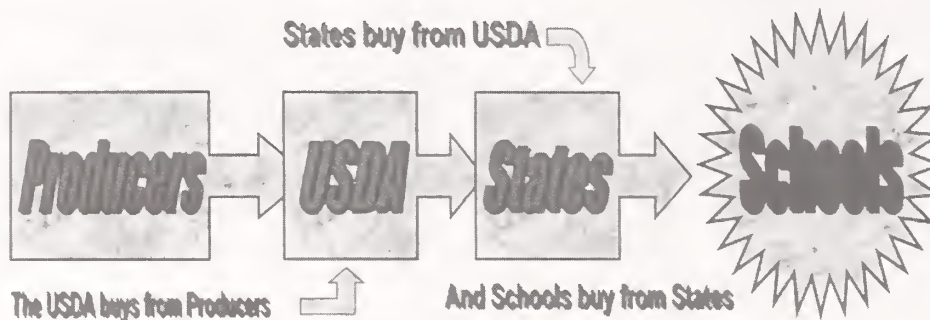


"Customer"

- Definition of a customer - *"A Person who buys, especially one who buys regularly; as, she is one of our customers."* *

• * Webster's New World Dictionary

Ultimately, it's the SCHOOLS who make the purchasing decisions

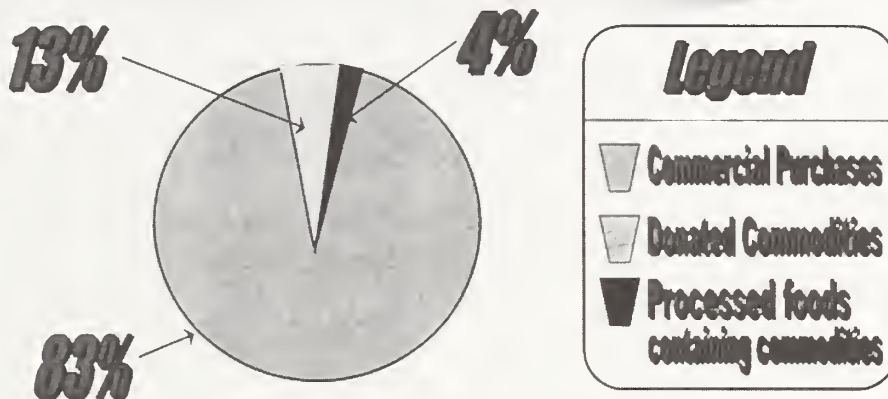


Think of growing this emerging school market



- Currently serving about 26 million meals per day
- Total meal opportunities are about 52 million per day

Percentage of Commodity vs Commercial in Schools



Cost of using commodities is a concern to schools



**Storage
Distribution
Labor**

*Think in terms of commodities as ingredients
and not necessarily a ready to eat product*



School Purchasing Trends



Suppliers
Bid methods
Co-ops

Think of "growing to the market"



EXPANDING WIC FARMER'S MARKETS

Michael Tabor

Farmer, Licking Creek Bend Farm, Needmore, PA

Stated simply, the WIC Farmer's Market Nutrition Program (FMNP) has been the best form of Federal and State help since I started farming some 24 years ago. What it does for me as a grower of fruits and vegetables is to bring large numbers of customers at a time (August) when I'm at the peak of production but many of my regular customers are on vacation. During that period, over a third of my customers are WIC FMNP recipients. And I'm very happy to have them at my market.

For those of you who are not familiar with the program, FMNP provides \$20 worth of coupons to WIC recipients in approved states, to buy fresh produce from over 9,000 farmers across the country. In FY 1999, FMNP advocates are expecting \$15 million to be available for the program (along with 30% matching requirements for states). However, no nutrition program should be seen as part of a piecemeal approach to the greater nutrition issues facing inner city (and suburban) children today. I feel the program should be included in the larger issues of nutrition and health concerns confronting this community. So, it should examine connections with schools and general attitudes about food and eating. This conference is an ideal forum in which to raise these issues - especially if we're looking at expanding the program (something which I, as a farmer, heartily endorse!)

What I find at the Maryland and Washington D.C. area markets I sell at is a growing disinterest among inner-city customers for fresh fruits and vegetables. We need to change this attitude. What many kids tell me, when I go to speak at their schools is that their typical breakfast is candy bars, cake or sodas, rather than a nutritious school breakfast. Lunches in some cafeterias are fast food imitations... chicken, pork and fish "nuggets", pizza or hamburgers. Salads and fruits, although they are offered, are often not eaten .

Although it's no longer permissible for tobacco and alcohol products to be peddled to teens, the fast food industry bombards American children on buses, TV, movies radios and in the schools. The messages tell children that a diet rich in high cholesterol burgers, caffeine and sugar-laden soft drinks, candies, deep fried snacks, are all desirable and even cool. Some parents succumb to the pressures and give their children what they are conditioned to want to eat.

We need to send out a different message. We need to make eating a nutritious lunch at home and at school...cool!

But it's not hard to understand why many parents have little idea about what to do with fresh mustard, collard, spinach and broccoli, except to perhaps overcook them and add fatty meat by-products. Or, why bother to cook in the first place, since the kids seem to eat mostly what comes out of the freezer or a can?

So, what to do to change WIC FMNP participants perception of a healthy diet? Here are some of my thoughts:

1. Undertake a national public education campaign coordinated with farm organizations, nutrition and health groups and USDA, aimed at showcasing fresh fruits and vegetables. Produce pro-bono ads showing Michael Jordan munching on a tomato, Celine Dion eating grapes, Madonna eating pears - all putting out the message that vegetables and fruits are sensuous, cool, and oh, even healthy!
2. At the local level, stress the use of positive male and female role models who eat healthily - teachers, coaches, sports figures, broadcasters, well-known professionals (from various local ethnic population, with whom young mothers, and children can identify).
3. That school cafeterias be showcases of healthy, tasty and nutritious local vegetables and fruits and whole grain breads, using ethnic recipes that emphasize fresh produce, and hire workers from WIC recipients as chefs and workers whenever possible. Perhaps even some of the students could participate in the preparation of the meals (in connection with school nutrition classes) and bring recipes from home. Students could be challenged to help prepare healthy, good tasting dishes which conform to the USDA food pyramid.
4. Prohibit in the schools vending machines filled with caffeine, sugar-laden (or sugar substitute) sodas, candies and snacks. Request that major vending companies offer products made with whole fruits (not 10% imported concentrates), and cold, natural, herbal teas mixed with fruit juices, lines of tasty frozen fruit sorbets on a stick (much like that available in Central and South America). Or, invite fruit farmers into the schools and during events to sell their products, along with apples, grapes and orange juices. (This could be combined with youth entrepreneurship whenever possible.)
5. That schools and government cafeterias be allowed to purchase food from local farmers - providing fresh, nutritious vegetables and salads. And that whenever possible, children be allowed to visit, participate in the harvest, and perhaps even glean donated vegetables and fruits for food banks and soup kitchens.

6. Encourage youth entrepreneurship projects as part of the program. For example, involve inner city youth with gardens, farmers, and the production of food such as applesauce, salad dressing, salsa, pesto. (Example, "Food from the Hood"). Any positive youth connection with local sources of fruit and vegetables is a positive step.
7. That farmers who are recipients of WIC FMNP coupons be asked to volunteer a few hours during the winter season in inner-city schools in a co-ordinated program aimed at giving the kids a better understanding of the "bio-region"; promoting an awareness of the traditional relationship that once existed between the rural areas that surround cities.
8. Organize health and food fairs where WIC FMNP coupons are distributed (thereby encouraging attendance). At the fairs, gourmet chefs and FMNP representatives could demonstrate what the regional produce is and how to prepare them. Booths for diabetes, high blood pressure, heart disease and cancer screenings could raise the level of awareness of health issues connected to bad diets. Ethnic cooking demonstrations could show alternatives to frying (roasting, broiling, baking and boiling). And local farmers could participate, meet their potential customers and customers could learn and taste what the farmers grow.
9. And, most importantly, combine, on the federal and local levels, a multi-agency approach using the resources of labor, education, agriculture and health agencies, whenever attempting to reach out to the WIC eligible population. With the eventual goal of getting them off WIC and other programs. And, at the same time, establishing better eating patterns.

Again, I want to emphasize that this WIC Farmer's Market program is the best thing that has come down the pike for vegetable and fruit farmers who sell their produce at direct markets. Personally, I would like to see the \$20 million FMNP request for FY2000 increased and included in a broader package aimed at encouraging a change in eating habits among our general population of school children and young mothers. If not, I believe we'll see higher future costs for health, hospitals and social security needs as this population ages. But, as an outsider to the bureaucratic process, I can only hope that the program becomes part of that larger strategy, coordinated with other agencies, and the private sector, aimed at doing what's in our best interest - helping the next generation to be healthy, alert, positive contributors for the future of our communities and nation.

Thank you.

GRAINS AND OILSEEDS OUTLOOK FOR 1999

Peter A. Riley
Agricultural Economist
Economic Research Service
U.S. Department of Agriculture

The early outlook for grains and oilseeds in 1999 is marked by the continuation of large supplies and low prices. While the details vary from commodity to commodity, demand prospects in the domestic market are favorable, while the export picture is generally more mixed. Further gains in soybean supply are projected to outstrip increase in use, and prices across the soybean complex will fall. Corn stocks and prices are projected to be steady while wheat stocks decline and prices rise moderately.

Outside of the United States and Western Europe, economic growth in much of the world has been poor in the last few months, and in many cases, negative. The outlook for 1999 calls for small improvements in many of the problem areas such as Southeast Asia, but serious problems will persist in the former Soviet Union and other countries such as Brazil. Obviously, this will be a source of continued uncertainty.

While U.S. grain exports have been weak recently, the domestic market for grain has been strong. This buoyant market has been characterized by fairly steady growth over many years, but this solid performance is often overlooked in the concern about exports. In 1999, domestic consumption is projected to rise again for the grains and soybeans.

Several difficult questions that will be discussed at this conference have an important bearing on the outlook. How will farmers react to low prices in planting decisions, both in the United States and overseas? How fast will key countries recover from economic and financial difficulties? Will low prices spur greater purchases by users abroad, or will low income growth outweigh the attraction of low prices? None of these can be answered with certainty. In addition to facing the usual concerns about weather as planting season approaches, U.S. producers will be challenged by another tough year in the market.

The Low Price Environment: How Did We Get Here?

To better understanding the weak price outlook, a brief look back might be helpful before looking ahead. The Asian financial crisis and subsequent economic problems in many other countries have contributed to weak commodity prices, but the roots go back further. In 1995, record high prices provided strong incentives to grain producers to expand production, and they did, both in the United States and abroad. In 1996, global production of wheat increased 44 million tons to a new record, reflecting higher acreage and good yields, and then it rose a further 27 million tons in 1997. Similarly, global coarse grain output soared in 1996, jumping more than 100 million tons to a record high, although production then slipped in 1997.

Oilseeds experienced a similar supply response triggered by high prices, although lagged by a year. Led by gains in soybeans, global oilseed production in 1997 increased 24 million tons to a record high. Again, there was a striking increase in area, and favorable weather boosted yields. This was followed by a smaller production increase in 1998.

Against this backdrop, world trade in coarse grains declined in 1997/98, and is only increasing modestly in 1998/99. Although the volume of world wheat trade held up in 1997/98, it is down sharply in 1998/99, and is forecast to be the lowest since the mid-1980's. However, even before world imports began to falter, U.S. grain exports started to weaken in 1996/97 as the United States lost market share in the face of strong competition from other suppliers. U.S. exports and market share for corn has increased in 1998/99, but it remains relatively low by historical standards. For wheat, the volume of U.S. exports and market share has improved only marginally.

Oilseeds trade has been stronger and this helps explain why soybean prices have showed more strength relative to the grains despite large supplies. World trade in the major oilseeds was record high in 1997/98, and has remained strong in 1998/99, even though the volume of soybean trade will decline. Global trade in the major protein meals, including soybean meal, has increased for the last several years, and will be record large again in 1998/99. Likewise, vegetable oil trade, including soybean oil, is also expected to be record high in 1998/99, although its rate of growth has slowed. U.S. exports of soybeans and products have been comparatively strong, even with some loss of market share to South America. However, in 1998/99, U.S. exports are contracting, largely accounting for recent price weakness.

Changes in many countries account for shifting trade patterns, but China stands out as an important swing factor in global trade. Imports by China have been an important force in driving up trade in both soybeans and soybean meal in recent years. This presents a stark contrast to wheat and corn, where China's imports have shrunk sharply. China was the world's largest wheat importer in 1995/96, taking more than 12 million tons, but its imports have since shrunk to around 2 million tons. In the case of corn, China has switched from a net importer in 1995/96 to a large net exporter. For wheat and corn, very large crops and an apparent slowing of consumption growth have reduced import needs.

U.S. Acreage in 1999: Wheat and Corn to Drop, Soybeans to Increase

U.S. plantings of the major field crops increased sharply in 1996 to the highest level since the early 1980's, but they have declined each year since. In 1999, another decline is likely, given low price expectations. Combined plantings of wheat, corn, and soybeans may drop 4 million acres to 214.5 million. Wheat is expected to decline more than 3 million acres to 62.5 million, with corn expected to fall 1.7 million to 78.5 million. However, soybean plantings are expected to rise about 1 million acres to 73.5 million, another record. These acreage projections are based on early February market conditions, and, except for winter wheat, are not based on producer surveys. The National Agricultural Statistics Service (NASS) will publish USDA's first survey-based planting intentions at the end of March.

Because it is early, changes in market conditions over the next few weeks could lead to considerable shifts from these projections for spring wheat, corn, and soybeans. In some areas, particularly drier areas, more land may be fallowed in 1999. Acreage of the other feed grains (grain sorghum, barley, and oats) is expected to show little change from 1998 and remain near historical lows due to relatively low returns. Cotton plantings are likely to increase in 1999, but the growth will probably be modest. Rice area is also expected to increase, but this will be small and largely confined to the Delta. Despite grower interest in alternative crops, market opportunities for most of these crops will be relatively limited. Acreage for sunflower, canola, and other minor oilseeds has expanded sharply since 1996, and another small increase in plantings is expected this year despite signs of weakening markets for vegetable oils. A small increase in dry edible beans and other pulses is also likely, but this acreage is very small relative to the major crops.

The big acreage story in recent years has been the dramatic expansion in soybeans. In 1998, planted acreage reached a record 72.4 million acres--up 11 million from 1995. This reflects favorable market conditions and greater flexibility under 1996 farm legislation. The end of program provisions under the old legislation that tended to boost corn over soybeans have made soybeans more competitive. Farmers have had good success with the crop in areas that in the past were sometimes considered too dry or having too short a growing season. This success is partly due to favorable weather conditions, such as no early frosts, and varietal improvements. The introduction of herbicide tolerant soybeans such as Roundup Ready has cut production costs for many farmers, adding to soybeans' appeal.

Although soybean market prospects have begun to slip in recent months, many producers will focus on the loan rate in making production decisions for 1999 rather than cash or futures prices. Currently, the national loan rate of \$5.26 per bushel for soybeans is attractive relative to the \$1.89 rate for corn or the \$2.59 rate for wheat. Producers can attain this price through use of marketing loan provisions even if market prices are lower. Thus, although futures prices for soybeans have fallen below \$5.00 per bushel recently, and corn prices have strengthened a bit, an increase in soybean plantings is still expected this spring.

Soybeans are expected to remain very popular in the western and northern fringes of the Corn Belt in 1999. In general, soybeans compete well with corn in areas outside the heart of the Corn Belt. Much of the drop in winter wheat acres, especially for soft red wheat, may go into soybeans. While many producers in the Midwest will tend to stick to corn-soybean rotations, much of the uncertainty lies with producers elsewhere. For example, corn acres are likely to decrease in the south and southeast after drought cut production and led to widespread disease problems in 1998, but it is not clear what the acres will be used for. Assuming only a modest increase in cotton acres, then soybeans will probably be in the running.

The 1999/2000 Crop Outlook

These forecast were updated in early February and may be slightly different from 1999/2000 numbers contained in the long-run baseline projections made in November that are also released at this conference. In most cases, changes reflect adjustments made in the outlook for 1998/99

published in recent *WASDE* reports. However, some adjustments are also due to the recent 5-year revisions in U.S. area, yield, and production.

Most of the initial U.S. agricultural attache forecasts of foreign country supply and use will only become available in the next few weeks. These reports, along with the March *Prospective Plantings* and *Grain Stocks* reports, could alter our projections significantly. USDA will publish its first forecasts of the supply and demand balance sheets in the May *WASDE* report.

Wheat

U.S. wheat production is projected to decline 15 percent in 1999 to 2,175 million bushels, based on declines in acreage and yield. If realized, this would be the lowest crop in 4 years. Based on NASS survey data released in January, winter wheat seedings are estimated at 43.4 million acres, down more than 3 million from 1998 and the lowest since 1972. Spring wheat plantings are projected at 19.1 million acres, down slightly from 1998, but moisture conditions as well as market factors will help shape final planting decisions.

Using a rounded average of the last 3 years gives an average wheat yield of 39.5 bushels per acre, down from the record 43.2 bushels in 1998. Like the acreage question, there is considerable uncertainty when forecasting yield. Identifying a reliable yield trend is difficult. Average U.S. wheat yields essentially flattened out for most of the 1980's and first half of the 1990's, but then spiked up sharply in the last 3 years. It appears that much of this surge reflects favorable growing conditions rather than wholesale genetic improvements or changes in cultural practices. In any case, any significant deviation in 1999 yields will have a big impact on production. A change of 4 bushels from the yield used here with the same acreage would amount to a swing of 220 million bushels.

Carryin stocks of wheat in 1999/2000 will be large, projected at 980 million bushels which would be the highest since 1988/89. Because of this, wheat supply is projected to drop only about 3.5 percent—not as much as the expected fall in production—and still higher than 1997/98. Imports are projected to be unchanged at 95 million bushels.

Demand concerns will be equally or even more vexing than those surrounding wheat supply. Total use is projected to rise 2.5 percent in 1999/2000 based entirely on larger exports. Domestic use is expected to slip because lower anticipated feed and residual use will outweigh smaller gains in food use. Assuming no major quality problems, low corn prices will make wheat less attractive for feeding. The season average farm price of wheat is projected at \$2.95 per bushel, up 25 cents from the mid-point of the 1998/99 forecast. Although the ratio of stocks to use will decline, continued weak prices of other commodities will also influence the wheat market.

Another small increase is projected in wheat food use, however. In calendar year 1998, the volume of wheat ground for flour surpassed 900 million bushels for the first time. Over the last decade, growth has averaged 1.9 percent per year as per capita use approaches 150 pounds per year. The popularity of many new wheat-based products such as tortilla wraps, as well as continued growth in bagels, pizza, and other specialty items, have contributed to the growth.

U.S. wheat exports are projected to rise 12 percent to 1,150 million bushels, including the portion of donations that are not expected to move in the 1998/99 marketing year. Nevertheless, total exports would still be comparatively low, constrained by continued strong export competition and small growth in imports. The U.S. market share is projected to improve slightly but remain below the historical average.

One concern underlying the disappointing level of U.S. wheat exports this year is the weakness in soft red winter wheat (SRW) exports. It has become apparent that SRW is no longer the wheat of choice for some traditional foreign buyers, while China, a very large buyer in the past, has dramatically reduced all wheat imports in recent years. Along with shrinking aid shipments in the 1990's which often featured SRW, recently there has been a reduction in the role of government procurement agencies in several countries. These agencies often bought the least expensive wheat available such as SRW and not necessarily the wheat most preferred by their millers and end-users. With millers now having a greater influence on purchasing decisions, SRW export prospects may continue weak, especially if competing classes of wheat remain cheap.

Corn

Corn production in 1999 is projected at about 9.5 billion bushels, down 3 percent from the year before. This would be the fourth consecutive crop over 9 billion bushels. Planted acres are projected down about 2 percent from 80.2 million in 1998, and the lowest since 1995/96, when there was an acreage reduction program in place. The long-term (1960-98) linear trend gives an average yield of 132 bushels per acre. This would be down 2.4 bushels from 1998, but the third highest ever.

Over most of the 1980's and 1990's, variability in corn production has been quite pronounced, largely due to weather. The last 3 years have been unusual because output has been relatively steady. While normal weather is assumed in these projections, a case of exceptionally good or bad growing conditions could have a big impact, similar to or even greater than the case of wheat discussed earlier.

Because of the lower prospective crop, corn supply in 1999/2000 is projected to increase only 2 percent, the lowest year-to-year increase in several years. Carryin stocks of corn are projected at 1,786 million bushels, the largest since 1993/94. With a gain in use expected to offset the increase in supply, ending stocks will show little or no change. While the stocks-to-use ratio is expected to slip from 1998/99 because of higher use, the farm price of corn is projected unchanged at \$1.95 per bushel. Sharply lower soybean prices will limit corn's upward price potential.

Total corn disappearance is expected to rise 2 percent on 1999/2000 and surpass the record set in 1994/95. The prospective new record reflects a different pattern, however, because exports will be significantly lower than the 2.2 billion bushels shipped in 1994/95, and the domestic market will account for a greater share of the total. Domestic use is expected to increase nearly 2 percent to 7.7 billion bushels, its third consecutive record, while exports are projected up 4 percent to 1.8 billion.

Feed and residual use of corn, the largest category, is expected to increase 1 percent in 1999/2000, given the increase in supply, low prices, and expectations that supplies of other feed grains and wheat will not increase significantly. Despite some cutbacks in beef cattle and shrinkage in the hog sector, animal inventories will remain very large and poultry expansion will keep total grain consuming animal units close to 1998/99.

Food, seed, and industrial use of corn is projected to increase 3 percent in 1999/2000, led by gains in high fructose corn syrup (HFCS) and ethanol. HFCS has had impressive, sustained growth over many years, tied to use in soft drinks and many processed foods, although use in low fat applications may have peaked. Corn used for ethanol, at a record pace for 1998/99 is expected to increase again as capacity expands. FSI use is expected to exceed exports for the third year in a row, an indication of both FSI's strength and the weakness of exports.

World corn trade in 1999/2000 is likely to rise slightly, largely due to some growth in East Asia and Mexico. However, the United States will continue to face strong competition from foreign exporters, especially Argentina. The outlook calls for higher corn production in Argentina based on improved prices relative to oilseeds. China is expected to maintain large exports, but to increase corn imports in 1999/2000.

Soybeans, Soybean Meal, and Soybean Oil

Soybean production is projected at 2,895 million bushels, up 5 percent from 1998 and the third consecutive record high. This is based on record large plantings for the second straight year, as discussed previously, and an increase in yields. The average soybean yield is projected at 40 bushels per acre, up from 38.9 last year, reflecting the trend over the last decade. The record high was 41.4 bushels, achieved in 1994. Yield growth has accelerated relative to earlier years as more growers adopted narrow row plantings. The popularity of Roundup Ready varieties is mainly seen as yield neutral in the U.S. and is used as a cost reducing strategy.

Record production and the largest carryin stocks in more than 10 years will propel soybean supply above 3 billion bushels for the first time in 1999/2000. Supply is projected at 3,310 million bushels, up 12 percent from the record of 1998/99. Abundant supplies and favorable prices will encourage use, but gains in disappearance are not projected to be big enough to prevent further stock building. Ending stocks are projected at 565 million bushels, the largest ever, surpassing the previous high of 536 million in 1985/86. This is expected to push the price of soybeans prices down to the lowest level in nearly 30 years, with the season average price projected at \$4.35 per bushel.

Low prices will boost consumption prospects and help regain U.S. export market share. After a dip in 1998/99, soybean crush is expected to rebound. Feed requirements for protein feeds will remain very large. Even with the likelihood of some contraction in the hog sector, expansion of broiler production will boost the number of high protein consuming animal units. The amount of growth in the crush is also tied to international sales of products, and both meal and oil exports are expected to increase in 1999/2000.

Soybean exports are projected at 930 million bushels in 1999/2000, reversing the decline of the last 2 years, and eclipsing the 1996/97 record. Much of the outlook will hinge on how South American producers react to the low prices. Brazil's recent devaluation has raised internal soybean prices, partly cushioning the impact of the global price decline. However, imported inputs such as fertilizer and chemicals will be much costlier while the availability of credit will be a question, along with what rate of interest. Productivity could suffer as well as plantings. An increase in the area of corn, which typically uses fewer inputs in Brazil than soybeans and is less expensive to grow, could reduce soybean area for the next crop, which will not be planted until the fall of 1999.

U.S. soybean oil production is projected to increase after a small decline in 1998/99. Total use is projected to increase, but not as much, leading to some increase in carryout stocks, and further slippage in prices. Domestic use will continue its long-term growth, while exports are projected to partly recover from a decline in 1998/99. After surging because of tight supplies of palm oil and other soft oils such as canola, global vegetable oil markets have begun to cool recently. One factor has been China's greater interest in importing oilseeds (mainly rapeseed) to meet oil needs. Globally, the outlook is for healthy consumption growth, but larger production in 1999 will constrain U.S. oil export prospects. Rapeseed and sunflower oil output is expected to increase in several important producing countries, and palm oil could recover sharply from the El Nino drought of last year in Southeast Asia. However, the extent of the recovery is still far from certain. In any event, because of abundant supplies, soybean oil should be price competitive.

The soybean meal outlook is similar to the rest of the soy complex: increased production and supply, higher domestic disappearance and exports, and falling prices. Meal prices could fall to the lowest level since the early 1970's. These attractive prices will promote domestic use, as well as exports. Nevertheless, global consumption growth could slow from 1998/99, particularly in the EU and other developed market economies as hog inventories drop. In Asia, there are indications that consumption could actually increase in some countries as financial problems ease. China remains a huge uncertainty but is expected to be a larger consumer of protein feeds in 1999/2000 after working through some accumulated stocks. Recent rumors that China will impose a value added tax on soybean meal only adds to the uncertainty, but, if implemented, it could shift the trade mix in favor of soybeans.

Table 1.--Wheat: Supply, Demand, and Price

	1997/98	1998/99 1/	1999/2000 2/
Area planted (mil. acres)	70.4	65.9	62.5
Area harvested	62.8	59.0	55.0
Yield (bu./acre)	39.5	43.2	39.5
Production (mil. bushels)	2,481	2,550	2,175
Beginning Stocks	444	722	980
Imports	95	95	95
Supply	3,020	3,368	3,250
Feed and residual	248	350	275
Food, seed, & industrial	1,009	1,013	1,024
Total Domestic Use	1,257	1,363	1,299
Exports	1,040	1,025	1,150
Total Use	2,297	2,388	2,449
Ending Stocks	722	980	801
Farm Price (\$/bushel)	\$3.38	\$2.70 3/	\$2.95

1/ Forecast. 2/ Projected. 3/ Mid-point of forecast range

Table 2.--Corn: Supply, Demand, and Price

	1997/98	1998/99 1/	1999/2000 2/
Area planted (mil. acres)	79.5	80.2	78.5
Area harvested	72.7	72.6	71.9
Yield (bu./acre)	126.7	134.4	132.0
Production (mil. bushels)	9,207	9,761	9,490
Beginning Stocks	883	1,308	1,786
Imports	9	12	10
Supply	10,099	11,081	11,286
Feed and residual	5,505	5,700	5,775
Food, seed, & industrial	1,782	1,870	1,925
Total Domestic Use	7,287	7,570	7,700
Exports	1,504	1,725	1,800
Total Use	8,791	9,295	9,500
Ending Stocks	1,308	1,786	1,786
Farm Price (\$/bushel)	\$2.43	\$1.95 3/	\$1.95

1/ Forecast. 2/ Projected. 3/ Mid-point of forecast range.

Table 3.--Soybeans: Supply, Demand, and Price

	1997/98	1998/99 1/	1999/2000 2/
Area planted (mil. acres)	70.0	72.4	73.5
Area harvested	69.1	70.8	72.4
Yield (bu./acre)	38.9	38.9	40.0
Production (mil. bushels)	2,689	2,757	2,895
Beginning Stocks	132	200	410
Imports	5	6	5
Supply	2,826	2,963	3,310
Crush	1,597	1,590	1,660
Seed and residual	158	153	155
Total Domestic Use	1,755	1,743	1,815
Exports	870	810	930
Total Use	2,626	2,553	2,745
Ending Stocks	200	410	565
Farm Price (\$/bushel)	\$6.47	\$5.20 3/	\$4.35

1/ Forecast. 2/ Projected. 3/ Mid-point of forecast range.

Table 4.--Soybean Oil and Meal: Supply, Demand, and Price

	1997/98 1/	1998/99 2/	1999/2000
OIL:			
Beginning Stocks (mil. lbs.)	1,520	1,382	1,365
Production	18,143	18,070	18,725
Imports	60	63	60
Supply	19,724	19,515	20,150
Domestic Use	15,264	15,600	15,800
Exports	3,077	2,550	2,750
Total Use	18,341	18,150	18,550
Ending Stocks	1,382	1,365	1,600
Avg. oil price (cents/lb)	25.8	24.3 3/	23.5
MEAL:			
Beginning Stocks (1000 s. tons)	210	218	275
Production	38,171	37,767	39,376
Imports	55	50	50
Supply	38,436	38,025	39,700
Domestic Use	28,888	29,850	30,550
Exports	9,330	7,900	8,900
Total Use	38,218	37,750	39,450
Ending Stocks	218	275	250
Avg. meal price (\$/ton)	\$185.54	\$137.50 3/	\$117.50

1/ Forecast. 2/ Projected. 3/ Mid-point of forecast range.

UTTERBACK MARKETING SERVICES, INC.'S 1999 MARKET OUTLOOK

Robert L. Utterback
Farm Journal Outlook Editor
Utterback Marketing Services, Inc. President

Before I discuss my 1999 price outlook for grains and oil seeds, I would like to thank Jerry Rector, Raymond Bridge, and the World Agricultural Outlook Board for the opportunity to speak to you today. My primary audience is usually producers, so many of you may not recognize me. Since early 1980, I've been helping farmers throughout the United States develop and implement marketing plans for merchandising their products throughout the U.S. Currently as *Farm Journal's* outlook editor, I have sought to help producers understand the marketing issues facing them. I am also president of Utterback Marketing Services, Inc., a full-service brokerage office. We develop strategies for grain and livestock producers. And as brokers, we actually enact the strategies for our clients. We have to deal on a daily basis with the consequences of being wrong!

A wave of anxiety about prices is washing over everyone from the producer to the banker to the local implement dealer. We've talked with farmers throughout the Midwest the last few months. Those attending meetings we spoke at are not a scientifically chosen sample, but we think the producers at these meetings--from Lafayette, Indiana, to Grand Island, Nebraska--are representative of the overall farm population. Their two most frequent questions were, What can I do about old- and new-crop corn and soybeans? and Is the Freedom to Farm Act the farmer's friend or foe? Time only permits me a discussion of the first question, I hope to hear from many of you about the latter.

What will old- and new-crop prices do? Well, let's start with corn, and consider the near-term and potential future fundamentals.

CORN SUPPLY AND DEMAND	96/97 97/98		1998/99				
			DEC.	JAN.	FEB.		
PLANTED	79.5	80.2	80.8	80.2	80.2		
HARVESTED	73.1	73.7	73.8	72.6	72.6		
YIELD PER HARVESTED ACRE	127.1	127	133.3	134.4	134.4		
BEGINNING STOCKS	426	883	1,308	1,308	1,308		
PRODUCTION	9,293	9,366	9,836	9,761	9,761		
IMPORTS	13	9	10	10	12		
SUPPLY, TOTAL	9,732	10,258	11,15	11,079	11,081		
FOOD	5,302	5,505	5,850	5,700	5,700	EXP	UP 50
FOOD/SEED/INDU.	1,692	1,782	1,880	1,870	1,870		
DOMESTIC USE	6,994	7,287	7,730	7,570	7,570	EXP	7,620
EXPORT	1,795	1,504	1,700	1,700	1,725		
TOTAL USE	8,789	8,791	9,430	9,270	9,295	EXP	9,345
ENDING STOCKS	883	1,308	1,724	1,809	1,786	EXP	1,736
CCC INVENTORY	2	4	4	5	12		
FREE STOCKS	881	1304	1,720	1,804	1,774	EXP	1,724
OUTSTANDING LOAN	179	310	325	325	325		
AVERAGE PRICE	\$2.71	\$2.43	\$2.00	\$1.95	\$1.95		
SOURCE: USDA							

The only figure we really would take exception with is the 150-million-bushel reduction in the feed-usage estimate between December and January. We think that's mostly based on the assumption that livestock herds are not going to be reduced as fast as anticipated. Recent government efforts to help hog producers, and the rally above the \$40 (live weight) break-even level by the deferred hog futures, have encouraged producers to modify or postpone their decisions to liquidate. We fear the herd liquidation figure in the April hogs and pigs report will fall short of the 6.5% level indicated in the December report and well below the 8 to 10% currently being discussed by the trade. That leads us to conclude that the feed-usage drop the USDA has anticipated will be limited. We do recognize the competition on the Western plains from wheat on feed utilization--which is so good and cheap that many producers in Nebraska tell us feedlots are simply not interested in their corn. We would be more comfortable with at least 50 of the 150-million-bushel feed reduction creeping back, raising feed use to 5.750 billion bushels; that would make total usage 9.345 billion bushels, and drop carryover to 1.736 billion. Some would say this is nit picking since it will most likely not be enough to change the growing negative attitude of the market. We just want to start our 1999 projects with as good a number as possible.

Three Possible Acreage Projections For Corn. Let's consider three possible acreage projections for corn for direction, that should be resolved by the March 30 report. In one, acreage is down 1.5 million from last year's final planted numbers, due to production problems outside the traditional Corn Belt--such as in the South--caused by drought or disease. In the second, that drop in the South is partly offset by winter wheat acres moving to corn acres in the Midwest; making for a net corn-acreage drop of about 800,000 acres. Then there's a possibility that's more bearish yet: The reduction in the South is less than anticipated since cotton prices are under pressure, the winter wheat acreage goes heavily into corn because of rotation and low soybean prices encourage more corn planting elsewhere. Here's something for the bulls to consider: In the end, bullish hopes could be blown up by a limited drop in total acreage plus the addition (not loss) of more productive acres in yield, with an end result of a limited drop in production.

As for where we stand, early this year we thought that the acreage drop would be less than the trade projected, but recent discussions with Western producers have changed our thinking. We now feel there is going to be a push to rotate acreage that has been in continuous corn, and plant some beans. We now think the March 30 USDA report will project a drop in corn acreage of more than 800,000 acres. Please note that our hunch is, if December corn futures are trading at \$2.40 or higher at planting and November soybeans is at \$5.20 or lower, the March 30 projected acreage number could turn out to be the lowest of the year for corn. In our opinion the incentive to plant soybeans will not be as attractive, and growers will likely plant more corn, if weather permits.

1999 UMS CORN - WHAT IF?

	1999 PROJECTIONS		
	ACRES	ACRES	ACRES
	Dn1.5	Dn.8	Up.6
PLANTED	78.7	79.4	80.8
HARVESTED 92% OF PLANTED	72.4	73.0	74.3

Our working assumption going into this year is that it's going to be more difficult to get a yield loss due to weather influence because of where the crop is produced. Without a major dry weather event (some are saying it has the potential of over 40%), we feel the potential exists, with moisture already rather good, to have yields at trendline plus.

With acreage down just modestly, we believe the only potential price-rally engines should be lower yield or stronger demand. The producers are starting to realize this and that is why they are getting scared.

We'll start with yield. There are two things to consider first: Good late-fall weather allowed producers from Ohio to Nebraska to get a lot of their tillage and pre-planting work done, and producers' concerns about late-summer La Nina weather trouble will likely drive them to plant both corn and beans EARLY and HARD if they don't have a wet spring. We would also suggest a positive impact of the Freedom of Farm has been the implementation of a good 50-50 rotation mix of corn and beans. The end result is acreage is more rested and recharged to increase the corn production potential. To get an idea of the range of possibilities, let's consider three scenarios. In the first, delayed plantings and significant summer weather trouble cut yield 15% reduction from the 134.4 bushels an acre of 1998--along the lines of the 18.1% drop of 1995, not near the 1983 reduction of 28.4%, the 1988 reduction of 29.4% or the 1993 reduction of 23.4%. Frankly, if seriously projecting a yield drop that great, my best recommendation for the producer might be not to plant. Any producer will tell you he would prefer big production and low prices to low production and high prices.

The second scenario is of a **typical year, with yield reaching the average of the last three years'**--though we believe the result is slightly low, given the possibility that better-producing acres will be substituting for some worse-producing ones this year.

Finally, let's consider a **modest yield increase of 2.5% from last year's level**; that would still leave it short of 1994's record yield of 138.6 bushels an acre, which we all know will be exceeded one of these years.

1999 UMS CORN - WHAT IF?

	1999 PROJECTIONS		
YIELD PER HARVESTED AC.	114.2	129.4	137.8
BEGINNING STOCKS	1,736	1,736	1,736
PRODUCTION	8,269	9,452	10,244
IMPORTS	12	10	10
SUPPLY, TOTAL	10,015	11,198	11,990

So our three scenarios suggest corn supply of 10 billion to 12 billion bushels for the 1999 season. Let's consider three demand scenarios as well.

1999 UMS CORN - WHAT IF?

	1999 PROJECTIONS		
FOOD	5,600	5,775	5,850
FOOD, SEED/INDU.	1,776	1,924	1,964
DOMESTIC USE	7,376	7,699	7,814
EXPORT	1,587	1,776	1,863
TOTAL USE	8,963	9,475	9,650

The demand side of the equation is more difficult to predict for 1999. Our opinion is biased since we work with the producer rather than the end user; but we suggest the following as starting points. On feed consumption, the first, low estimate assumes that higher grain prices and continued herd liquidation reduces demand-- down 1.7%, the second that consumption goes up 1.3% and the third that it goes up 2.6% because hog producers expand. The first industrial usage estimate represents a 5% drop, just as we saw in 1995. The second, likelier one is for a gain of 3%, a conservative increase based on the assumption that lower prices will stimulate usage. The third reflects a 5% increase, along the lines of what we saw in 1994, 1996 and 1997.

Exports are the big unknown and where we need the growth to change the bears' grip on the market. Did low 1998 hog prices force liquidation outside the U.S., which could reduce the demand for feed grains globally? What effect will a weaker dollar have? Will there be a surprise government program to stimulate usage as the 2000 election nears and political pressure mounts? Add these background uncertainties to exports' tendency to leap and dive, and you see the difficulties. The last three years have all brought double-digit changes: A 19.4% drop from 1995 to 1996, a 16.2% drop from 1996 to 1997 and a 13% rise from 1997 to 1998. And it's only a few years since the 63% jump between 1993 and 1994. To say the average change over the last five years has been 8% really doesn't do these gyrations justice. Still, we must make a projection just the same: a 3% increase for the mid-range, flanked by an 8% decline and an 8% increase.

The result: Our total usage estimates range from 8.963 billion bushels to 9.650 billion.

1999 UMS CORN - WHAT IF?

	1999 PROJECTIONS		
ENDING STOCKS	1,052	1,723	2,340
CCC INVENTORY	12	12	14
FREE STOCKS	1,040	1,711	2,330
OUTSTANDING LOAN			
STOCKS TO USE	12%	18%	24%
U.S. AVERAGE YEARLY PRICE	\$2.50	\$1.95	\$1.50

And there we have an answer to the question about corn prices.

So if acres are dropped at least 1.5 million and we have one of the largest year-to-year drops in harvested yield, and demand declines only modestly, we feel the best we can hope for in 1999 is that stocks reach a reasonable 1.053 billion bushels, which would set things up nicely for a summer bounce in 2000--driven by weather or politics. The mid-range estimates lead to a carryover of 1.7 billion bushels, just slightly less than where it is now. Still, we project a yearly price about 10 cents lower than in 1998, based on an uncertain international economy and bearish pressure from wheat and beans.

Then there is the third possibility: no reduction in planted acres, increased yield and only modest demand growth. If these come to be, free stocks could reach their highest level ever, and prices could drop to levels not seen since the 1960s. We hope to see the first alternative, and my fear the latter.

UMS Assumptions for 1999:

- Producers will sell only limited amounts of their unpriced loan deficiency payment inventory before March 1.

- Producers will put inventory under loan and try to starve the market this spring.
- Elevators will offer free deferred pricing or allow producers to deliver summer forward contracts in April and May, which gets the inventory the end user needs met at this time.
- USDA's March 30 prospective plantings report will forecast a modest decline in corn acreage, but will eventually end up below a one million acre reduction.
- Mid-May will be a key period for the market. If the May 10 crop progress report doesn't show signs of delayed planting, and the May 12 supply/demand report doesn't show higher usage, any spring rally will grind to a halt.
- Adequate soil moisture means weather-related crop difficulties, if they come at all, will be late like 1983.
- The loan deficiency payment will be a critical part of any profit from the 1999 crop. Please note that, if USDA is to maintain any credibility with the producers in the new age of the farm program, we cannot emphasize strong enough the LDP payment differentials not be played with to reduce potential budget exposure and subsequently reduce farmer payments.
- It is our belief that producers must be alert to defend against a 1998-style early harvest low and fall recovery influence on their LDP payments.

We start with the assumption that producers who made use of the loan deficiency payment program last fall did little in the way of pricing. The price was too low to motivate selling, and many producers still don't understand the implications of a large-carrying-charge market. The result is that a tremendous number of producers are still holding unpriced inventory. Current prices represent a loss for them, and my years of working with producers tell me they are not going to let go of the inventory. It should be noted that we do not believe farmers will store as aggressively in 1999 as they have over the last three years. This belief is based on the assumption that, if prices are under pressure, bankers will want loans cleaned up, as well as the significant amount of short interest in the grain elevators.

As for the near future, we expect a short-covering rally to develop gradually as March 30 approaches. In our opinion it will be more in the deferred than the nearby contracts. End users, scrambling for inventory, will likely buy the March futures and force delivery, which could also help to rally the market. We feel the March 30 report will confirm an acreage reduction, setting the stage for a flat-price rally in April and May; the extent of the rally will heavily depend on the incidence of planting delays. Producers will likely continue to sit on their crops, leaving the market cash-starved. We believe there will be a key stretch of days in mid-May for producers to watch. If the May 10 crop condition reports that plantings are at or above the five-year average and no significant delay-causing rain is expected, prices of deferred futures will start to soften. In our opinion, May 12th will be D-Day for 1999 marketing decisions; if the supply/demand report shows no sign that lower prices are creating significantly higher usage, the market will have no alternative but to send prices for deferred contracts lower, with the downward momentum increasing as crop progress continues.

In our opinion, the critical variables for corn are when producers sell corn, how many acres they plant, how livestock production holds up, how much is exported and, the big wild card, whether the government tries to stimulate demand or change policy on the use of LDP.

SOYBEAN SUPPLY/DEMAND	1996/97	1997/98	1998/1999	
			JANUARY	FEBRUARY
AREA				
PLANTED	64.2	70.6	72.4	72.4
HARVESTED	63.4	69.6	70.8	70.8
YIELD PER HARVESTED ACRE	37.6	38.8	38.9	38.9
SOURCE: USDA				

In the past many producers counted on soybeans to be the mortgage lifter, and this year they want to know if they can count on the price hitting \$6.50 again. Well, let's look at the numbers, starting with supply.

BEGINNING STOCKS	183	132	200	200
PRODUCTION	2,380	2,689	2,757	2,757
IMPORTS	9	5	6	6
SUPPLY, TOTAL	2,573	2,826	2,963	2,963
SOURCE: USDA				

Essentially, we have no quarrel at all with this side of the February report. The working supply is expected to be a relatively modest 4.8% larger than last year's -- but 15% larger than that of two years ago. Is demand going to keep up?

CRUSHING	1,436	1,597	1,595	1,595
EXPORTS	882	870	830	810
SEED	83	86	87	87
RESIDUAL	42	86	61	65
TOTAL USE	2,443	2,626	2,573	2,553
ENDING STOCKS	131	200	390	410
AVERAGE FARM PRICE	\$7.35	\$6.45	\$5.35	\$5.20
SOURCE: USDA				

In our opinion, no -- clearly, demand has fallen on hard times. Total use was projected at 2.573 billion bushels in the January report, the February report indicated a reduction in exports (as expected), which reduced use to 2,553. In fact, by the time we get to fall, we expect the carryover projection may well be higher than the current 410 million bushels. But for the sake of our "what if?" analysis, we will use 410. It is over three times the carryover of two years ago, and twice that of last year, and will result (USDA estimates) in an average price that's down 29% from that of two years ago and 19% from that of one year ago. The nagging question, with potential for large carryover, how low will prices have to sink before usage is stimulated and acreage is reduced here and abroad?

1999 UMS SOYBEANS - WHAT IF?

	1999 PROJECTIONS		
	UNCHANGED	UP 1.75 MIL.	UP 2.75 MIL.
PLANTED	72.4	74.2	75.2
HARVESTED @ 98.35%	71.2	73.0	74.0
YIELD PER HARVESTED AC.	32.7	38.5	39.5

Whether you want to argue soybean prices higher or lower depends heavily on your assumptions about bean acreage. We believe strongly that they're going up; the question is how much?

Consider the economics of the corn, wheat, cotton, and bean loans versus cash flow; beans are getting the nod by many producers. Finally, consider the pressure from bankers to reduce risk this year; beans are a favorite of producers. In our opinion, the conclusion is clear for producers: PLANT BEANS. What we're hearing about seed sales, especially in the western states supports this. Indeed, with the reduction in wheat acreage in the western states, we really believe there is a risk in being too conservative in forecasting bean acreage.

So we don't even consider the possibility that acreage will decline for 1999; our most bullish forecast is based on no change. Our midrange forecast assumes an increase of 1.75 million acres, and our most bearish an increase of 2.75 million.

As for the yield, let's assume for the low end a drop of 15% from last year's, to 32.7 bushels an acre, the lowest since flood-struck 1993, but far better than the 27 bushels of drought-struck 1988. That decline is just a bit short of the 16.37% average of the last four bad-weather years: The 1983 drop was 16.8%, the 1988 was 20.3%, the 1993 was 13.3% and 1995 was 14.7%. Remember that the seed plasma is better and producers are better equipped to get the crop in and out quicker.

1999 UMS SOYBEANS - WHAT IF?

	1999 PROJECTIONS		
	UNCHANGED	UP 1.75 MIL.	UP 2.75 MIL.
BEGINNING STOCKS	410	410	410
PRODUCTION	2,340	2,810	2,921
IMPORTS	8	8	8
SUPPLY, TOTAL	2,758	3,228	3,339

So the total supply for 1999 is projected to range from 2.76 billion to 3.3 billion bushels. With supply growth of this magnitude, pressure should be on the demand side to show major growth.

1999 UMS SOYBEANS - WHAT IF?

	1999 PROJECTIONS		
	UNCHANGED	UP 1.75 MIL.	UP 2.75 MIL.
CRUSH	1637	1670	1675
EXPORTS	850	880	910
SEED	90	91	91
RESIDUAL	59	59	59
TOTAL USE	2609	2673	2735
ENDING STOCKS	144	555	604
AVERAGE FARM PRICE	\$6.75	\$4.48	\$4.20

Again the demand side of the equation is where we feel the weakest is in our projections, but we're going to assume the best possible. The crush estimates suggest strong demand for oil, so our worst case scenario is that crush will be unchanged. Our mid-range is for a 3% rise, and the best case is an 8% rise to 1675 million bushels. History suggests we must assume a generous jump in export levels; but we're having trouble increasing substantially because of our concern about the currency devaluation wave, which washed over much of Asia in 1997 and hit Brazil just recently. In our opinion China is the big wild card in the export situation. Do they devalue their currency or put up trade barriers to protect their export market share? Again, government policy--both domestically and internationally--will become the wild card that will act to change today's estimates in the future for better or worse. **We're wondering if policy makers can stay out and allow prices to go into a steep decline in order to stimulate use and reduce**

production, or will political pressure increase to such a point that it will force a policy aimed at softening the negative impact of lower prices before next year's presidential election?

OUR ASSUMPTIONS FOR 1999 REGARDING SOYBEANS:

- Acreage will grow by at least 1.75 million acres, maybe more.
- Demand will respond to lower prices, but not fast enough to match the increase in production.
- Result: Carryover could potentially grow to a level not seen since 1985 and maybe to record highs.
- In our opinion only major government demand stimulation can prevent prices from moving well below the variable cost of production. We expect the average yearly U.S. price to be below \$5 for the first time since 1975.

So the working assumptions behind our 1999 marketing plan have been that production will rise faster than demand, allowing carryover to grow to historically high levels. We believe producers are still hopeful that significant policy changes will occur to save the 1998 season, but we ourselves are not -- we don't see the government acting, if at all, until after the 1999 crop is confirmed.

Given a potential 47% increase in carryover, how much of a price decline will it take to stimulate usage and discourage production? Unfortunately, we think it will require at least 14% -- which would mean a yearly average price of \$4.48 -- and that there's a real risk it will take 19%, which would mean a yearly average price of \$4.20! That would explode the government's LDP price payments.

Please note that many producers are wondering whether the USDA would play with the LDP differentials to keep government exposure cost down. It seems they are just now becoming aware of their downside risk exposure.

SUMMARY

We expect:

- A modest reduction in corn acres and a major increase in soybean acres.
- Not enough immediate demand growth for feed grains and oilseeds to prevent significant carryover build-up.

We believe:

- The degree of price risk depends on whether government policy allows a free fall in prices to develop, causing inventory to move and acres to be reduced.
- There are still opportunities for producers to grab a profitable price for their corn, but the soybean market is unlikely to offer anything better than **MARKETING LOAN LESS STORAGE COST PLUS OR MINUS BASIS GAIN.**
- The loan deficiency payment will be critical to producer survival.

We hope:

- The LDP program will not be influenced to reduce budget exposure.
- Help producers get a bigger piece of the income pie.
- Help to improve farmers' understanding of marketing risk exposure and developing better marketing plans to handle the increased market volatility.
- A review of policy to give some incentive to reduce acres when carryover exceeds 1.5 billion in corn and 350 in beans and 600 in wheat in the 2000 production year.

It has been my pleasure to speak with you about our outlook and our concerns for the 1999 corn and soybean marketing season. We hope that producers will use a spring price bounce to reduce downside price risk; but we're afraid that they will not move fast enough. The clock is ticking, and we may be on the edge of a financially taxing period for the American farmer.

Hypothetical performance results have many inherent limitations. Some of which are described below. No representation is being made that any account will or is likely to achieve profits or losses similar to those shown. In fact, there are frequently sharp differences between hypothetical performance results and the actual results subsequently achieved by any particular trading program. One of the limitations of hypothetical performance results is that they are generally prepared with the benefit of hindsight. In addition, hypothetical trading does not involve financial risk, and no hypothetical trading record can completely account for the impact of financial risk in actual trading. For example, the ability to withstand losses or to adhere to a particular trading program in spite of trading losses are material points which can also adversely affect actual trading results. There are numerous other factors related to the markets in general or to the implementation of any specific trading program which cannot be fully accounted for in the preparation of hypothetical performance results and all of which can adversely affect actual trading results. Before trading, one should be aware that with potential profits there is also potential for losses, which may be very large. You should read the "Futures and Options Risk Disclosure Statement(s)" and should understand the risks before trading. Commodity trading may not be suitable for recipients of this presentation. Those acting on this information are responsible for their own actions. Although every reasonable attempt has been made to ensure the accuracy of the information provided, Utterback Marketing Services, and its agents assume no responsibility for any errors or omissions. Any republication or other use of this information and those expressed herein without the written permission of Utterback Marketing Services, Inc. is strictly prohibited. Copyright Utterback Marketing Services, Inc. 1999.

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NEBRASKA AGRICULTURE – PRESENT AND FUTURE

Senator Ed Schrock
Nebraska State Legislature

I am a third generation farmer. My great grandmother moved to Nebraska in 1889. She was a widow and moved to Nebraska along with her 12-year-old son – my grandfather. They lived in a dugout through their first winter in south central Nebraska. So, my family's roots are deep in the soil of Nebraska. I farm with my father, two brothers and two sons. We raise irrigated corn, soybeans, specialty crops (popcorn and white corn), and wheat. We have a cow and calf operation and we have finished cattle in area feed lots. I sit on the Agriculture Committee in the Nebraska Legislature and am chairman of the Natural Resources Committee.

I would like to give credit to University of Nebraska-Lincoln agricultural economist Professor Roy Frederick for much of the statistical information contained in this speech. Dr. Frederick, who previously served as Director of Agriculture for the State of Nebraska, is currently with the Institute of Agriculture and Natural Resources at the University of Nebraska-Lincoln. Many of the statistics I will cite have been generated by the Nebraska Farm Business Association, an association of 480 Nebraska farms who input and share data with the Institute of Agriculture and Natural Resources for the mutual benefit of the association's members.

Historically, Nebraska is third overall among states in the production of corn and second in cattle on feed. We are an agricultural state. The state of the agricultural economy in Nebraska is not good. When final totals become available, 1998 net farm income will have been the lowest since the 1983-84 period. We continue to see about 3% annual attrition in the total number of family farms. I believe this percentage will increase during 1999.

As you know, the major problem is low commodity prices. Prices for most commodities produced in our state – corn, soybeans, wheat, sorghum, hay, fed cattle, feeder cattle and hogs – have been below year-earlier levels since about July 1, 1998. These price comparisons are even more meaningful when you realize that Nebraska net farm income in 1997 was down 40% from the previous year. In other words, what we are seeing is a continuation of a downward trend in what were already low prices.

Of course individual situations can vary widely from the overview I've just described. For example, a producer who forward contracted much of his or her 1998 crop production early in the year generally did better than one who waited until harvest to sell. In fact, the combination of forward contracting, loan deficiency payments and additional direct payments from the federal government late in the year allowed some producers to do very well. Higher than normal yields, especially for dryland crops also helped.

In general, those who had hog or cow-calf operations and did little or no forward contracting on their crops appear to have had the lowest net incomes. All hog operations lost

money in 1998. Final figures are not yet in, but the Nebraska Farm Business Association estimates (from the 480 farms reporting) an average per farm loss of \$2,000 from operations in 1998.

I won't spend much time on the factors that have contributed to lower commodity prices, but in brief, two items may be worth singling out:

First, red meat supplies have been large. For example, U.S. commercial red meat slaughter during December 1998 was up 6% from the previous year. More importantly, total red meats in cold storage at the end of that month were 14% higher than on the same date one-year earlier. Pork supplies alone were up 46%. I believe this is due in large measure to the relatively low prices for feed grain. Given the large carryover stocks of grain, I am not optimistic regarding future prices in the meat sector.

Second, U.S. agricultural exports are projected at just over \$50 billion for fiscal year 1999. This will be the third consecutive year of falling exports, after peaking near \$60 billion in fiscal year 1996. As exports have sagged, U.S. carryover stocks of corn, wheat and soybeans have more than doubled. Under "Freedom to Farm," we were promised an aggressive program of exports. We remain the supplier of last resort. That's sad.

It is estimated that carryover stocks of corn, wheat and soybeans will have doubled over the period from September 1997 to September 1999. Probably no statistic is more telling in terms of forward effect on commodity prices than is carryover stock of grain products. Stocks of red meats and other livestock products also have been impacted by the poor export situation.

It's important to remember that 60% of U.S. land under cultivation can feed our population. We do have excess capacity and so I emphasize the foreign market situation. If there are to be no supply control programs and if we are to plant fencerow to fencerow, we need to continue to develop our foreign markets. For most of the past 25 years, there has been a very strong correlation between agricultural exports and U.S. commodity prices. While our production can vary from year to year because of weather, livestock production cycles and other factors, the fact is that American agriculture seems to have done well when the export market is vibrant and not so well when foreign sales sag.

U.S. agricultural exports increased dramatically from 1972 until impact by the Carter grain embargo and its lingering long term damage to foreign markets. Exports did not rebound until 1986. Starting in 1986 and through 1995, exports increased from \$25 billion to \$60 billion annually, before falling the past three years. Exports typically account for only about 25% of gross farm income nationally. But we know that it sometimes doesn't take much of a change in demand to lead to much larger relative changes in commodity prices and farm income. Adding to the unpredictability (and the resulting instability) in this area, in relative terms exports tend to shift more dramatically year-to-year than do changes in domestic demand.

While ups and downs occur in commodity prices and incomes, there is no real indication that we are permanently and chronically overproducing for the market. It's just that in certain years, or even periods of years, we don't have a good balance between production and foreign demand for our agricultural products. The instability problem is made worse because each

producer knows that independently changing his or her production will have no influence on what happens in the sector as a whole.

When economic conditions deteriorate, we should be especially concerned about what we call middle-sized farms. This category of farms is neither the small, hobby-type where most of the family income is earned off the farm nor the large operations that gross \$500,000 a year or more. It's somewhere in the middle. It often includes beginning farmers or farmers who are at least still relatively early in their careers and trying to expand their operations. In a sense, this is the "incubator" category – the independent farmers of our future.

To put the plight of the middle-sized farmer in perspective, if we look at the recently-released 1997 Census of Agriculture, we see the following: In Nebraska, the overall number of farms and ranches is declining. However, the total number of large farms (gross sales of over \$500,000) are on the increase. Simultaneously, the total number of hobby-type farms (gross sales of \$10,000 or less) are also increasing. This combination of events left the number of middle-size farms down by over 10% so far this decade.

What about the role of government in addressing some of the challenges confronting the agricultural sector? First, it always has been (and probably always will be) difficult for government to design policy that is both equitable and efficient. Farm operations vary too much by size, locality, enterprise mix, debt status, management ability and other factors. With all due respect to congressional efforts to be fair, the fact is that government support is never enough for some operations and more than needed for others.

Having said that, I generally think government-subsidized crop insurance makes a great deal of sense. It can take into account different levels of risk by locality and by crop. It can protect prices as well as production. But there are still questions about how much risk the government should underwrite and how much should be the responsibility of producers.

There's no question that price supports and direct payments have been helpful to many producers over the years. However, traditional support programs have limitations in that they cover only a relative handful of agricultural commodities. Moreover, to the extent these programs have been linked with production adjustments, they haven't been very effective. Too much slippage occurs, primarily because the poorest land on the farm is always the land retired from production. For these reasons I would like to see the government safety net of the future focus mostly on crop insurance-type programs.

From the farmers' standpoint, risk reduction is appealing, but what is the exposure to the federal government once the risk is shifted? With a 10-bushel corn crop and low harvest-time prices, the federal government would have to pay out \$100 million in loan deficiency payments for every penny that the price dropped below \$1.89 (the national average loan rate). Other commodities (wheat, sorghum, soybeans, cotton, etc.) would be added to this total. What if corn was \$1.39 per bushel? That's another \$5 billion exposure to the federal treasury. Add to that the federal exposure on the crop insurance program. Was it Everett Dirkson who said, "A billion here, a billion there – pretty soon you're talking about some real money."

Federal direct payments for fiscal year 1999 are scheduled at \$5.6 billion. In addition, the federal government has about \$2 billion already invested in the crop insurance program for

this year. Private insurance companies would bear the cost of indemnities for losses under crop revenue coverage this year. You can bet that if there were massive losses under crop revenue coverage, the insurance companies would come back with a request for much larger subsidies from the federal government next year.

These are long term concerns, but as a farmer, what is my immediate experience and what are my expectations? On my own farm, I've been unable to rebid 75 acres of CRP ground. My first contract was for \$60 per acre. Currently CRP ground is paying \$40 per acre – a 33% decline. We keep approximately 1000 head of cattle on feed in a neighboring commercial feed lot. Our loss per head averaged about \$100 per head. We turned those cattle three times, thus losing about \$300,000 in 1998. That will get you out of the market real quick. I sold alfalfa hay last year at this time for \$85 per ton. Today I am bid \$40 per ton.

As our profits are squeezed or turned into losses, what is the net result on our underlying productive asset, our land? Over the past ten years, the value of our land has remained static and corrected for inflation, it has probably gone down in value. If we had sold our land ten years ago and invested the proceeds in the stock market, we would have more than tripled our money. So, are we in the trough of a cycle or are we looking at a long term downward trend in American agriculture? As a farmer, this is the question you have to ask yourself. My sons are 27 and 29. Both are college educated. We see many young men and women leaving the farm. Are they well advised to do so? Should the fourth generation of my farm family now make a decision to leave the land? It is their home, their livelihood, their history and their identity as a family. Is it now time for such young people to look away from the land and leave farming to the ever-growing corporate farming operations? Maybe it is, but I would hope not. There are no easy answers and the outlook is of course grim, but we are a hardy and optimistic lot. All we ask is a modicum of predictability, access to foreign markets and a level playing field.

SETTING THE STAGE FOR NEW TRADE NEGOTIATIONS A VISION FROM ARGENTINA

by Arturo Vierheller

Introduction

The new set of rules established during the URAA represents the genuine incorporation of agriculture into the multilateral rule system for the first time ever. In particular, they allow countries to use only decreasing, fixed tariffs at the border and force countries to reduce trade distorting subsidies.

However this process of tariffication produced a number of tariffs bound at very high levels and even with the agreed reductions still leaves agricultural trade barriers well above those for other traded products. Because of the succession of GATT rounds, manufacturing tariffs are now at modest levels, in the range of 5 to 10% in most of the cases while agricultural tariffs average above 40% with some so called mega-tariffs of over 300%.

The three major areas on which negotiation focus-market access, export competition and domestic support-provide a convenient framework not only for understanding the benefits achieved by the URAA but also to understand what is needed to complete the reform.

Some commodities have remained largely outside the reform process. The markets for dairy products and sugar remain highly protected in most countries. These products are very likely to be in the center of the discussion of the next round and probably will be followed by peanuts, poultry and rice.

In addition, the agreement on the application of Sanitary and Phitosanitary measures (SPS Agreement) established rules to make it easier to distinguish between disguised protection and genuine health and safety issues.

By projecting the rate of change under the current URA beyond 2000 it is unlikely to expect significant impact on trade and prices. The world needs more rapid measures to ensure a further deepening of the process of trade liberalization.

It is imperative then to accelerate the process of reducing the levels of agricultural import protection. Dependence upon artificial market whether it is done via keeping high import tariffs or direct intervention in the market using price support, blocks the signals from the consumers and distorts production and investment decisions. A country's best guarantee of food security is a diversified export sector that provides the funds for needed imports, along with the sound macro-economic policies to keep those export competitive.

Moving towards a more liberalized world trade with less participation of governments, not only would add transparency and efficiency, but would also close the door for possible corruption practices.

It is furthermore essential at the time that the negotiations re start to consider the agenda of such negotiations not only as a continuation of the URAA but to shape it considering the importance of the global economy and what has been called as the global food system. Abundant, accessible, affordable food supply of increasing quality, variety and reliability requires increasing efficiency in the world's agri-food system. To meet the demand of the poor, the emerging middle classes and the wealthiest consumers, barriers to agricultural trade should be removed.

Argentine Facts

In my country, Argentina, for many decades, the Government controlled the key industries like oil, electricity, natural gas, mining, telecommunications, ports, grain elevators, airlines, rail transport. This economic disorder created sky-high rates of inflation that reached during 1989 a figure near 5.000 %, as well as deficient infrastructure, reduced levels of investments, falling labor productivity, and growth of poverty.

A combination of dramatic market-oriented reforms implemented since 1989 and strong price incentives led the changes in the Argentine economy and particularly in the agricultural and food sector.

The bulk of the reforms took place after the convertibility law which in 1991 established the parity of one dollar equals to one peso. The deregulation of the economy, the across the board privatization of government owned industries and utilities, the opening up to foreign capitals and the restructuring of government institutions produced an accumulative change measured as a comparison from the decade 1981-90 to the average 1991-97 of GDP :from -11% to +51% and Industrial output : from -19% to +41%.

Among the specific reforms that directly benefit the agriculture/food sector where the dismantling of the National Grain Board, the National Meat Board, the National Sugar Bureau and the elimination of export taxes on agricultural commodities together with the tariff reduction on imported inputs like fertilizers, machinery, herbicides and pesticides.

During the last five years the annual sales of combines and irrigation equipment have duplicated. The use of fertilizers that during the 80's demanded 300.000 tons per year, in 1996 went up to over 2 million tons.

The cultivated area with no-till system increased from 500.000 hectares in 1991/92 season to 5 million hectares (about one quarter of the total crop land) during the last season, reflecting a very important change of attitude of our farming community.

Argentina has during the last few years advanced almost at the same speed as the United States in the commercial development of the genetically modified seeds, particularly in the case of soybean where, for the coming crop we expect a participation of above 30% of the total acreage.

The completion of the dredging of the Parana River waterway to 36 feet draft which will be hopefully finalized in about 2 years, will be the key for the further development of the heart of the Mercosur region by giving a much more competitive transport system to an area of 5 million square kilometers. We expect then the cargo traffic of this waterway to increase from the actual 7 million tons to 20 million tons in the next five years.

These measures induced the all time record crop that we had for the season 97/98 that reached the figure of 67 million tons on 26,1 million hectares whilst in the beginning of the decade, taking the 90/91 season, we produced 39,2 million tons on 20,7 million hectares.

I also want to mention the fact that particularly during the last nine years, there has been a constant flow of foreign and local investment in the food sector, based on the huge upside our country has in terms of adding value to our primary production. The oilseed crushing industry has led this process by investing during this period about 1,5 billion dollars to duplicate the crushing capacity that in 1990 was of 13,6 million tons to 27,3 million tons during 1998.

Not only we are adding value to our feed grain production through the enormous growth of the poultry and dairy sector but also cattle feedlots are becoming more and more common throughout our pampas (some American companies too). Furthermore the hog industry is about to start a big move in terms of expansion as a consequence of the abundance of low-cost corn and some other strategic considerations.

All the above mentioned development have contributed to position Argentina according to FAO statistics as the seventh world food producer and is ranked in the same position as food exporter also on a world basis. We have free markets, no subsidies and we are increasingly promoting the use of risk management tools like futures and options and insurance coverage.

The next round of trade negotiations in agriculture will begin in November of this year, in just 9 months. Argentina applauds the continuation of the agriculture negotiations respecting the time frame defined in the URAA Agreement. In our country, there is a strong consensus that continuing trade liberalization will bring benefits back, not only to the entire agricultural sector, but also to all the people of the world that consume or deserve healthy food on the daily basis. We therefore focus on the following objectives for the next round of negotiations.

New Round

Market Access

Market access remains the keystone of any trade negotiation. Tariffication, as was intended in the URAA has made the conditions of market access in agricultural trade significantly more transparent. What is now visible is the high level of protection for long hidden by non-tariff barriers. This level of protection in agricultural markets is in many cases, considered as very high and prevents trade from flowing.

The question for the next round is what process can be initiated to reduce tariffs so that they are no longer prohibitive.

The Uruguay Round Agreement instituted tariff rate quotas (TRQs) in those situations where

tariffs replaced non-tariff barriers. For specified quantities the tariff charged would be some fraction of that agreed as a bound tariff in the schedules. The quantity would increase over time, generally from 3 % to 5% of consumption. The idea was to provide a minimum of market opening where previously there was none. But, however laudable the aim, the existence of a TRQ still does not guarantee that level of imports. High in-quota tariffs, the way a TRQ is administered and the existence of STEs, can still restrict trade below that level. As a consequence additional disciplines will be necessary to ensure access in an improved way.

Different techniques can be used for implementing the improvement in market access which should be the heart of the new Round. They range from continuing the tariff reductions from the same base, across the board cuts, formula cuts, zero for zero reductions or binding the actual rates, to mention some of them. A criteria will have to be chosen since the reduction will have to be done.

We believe that the reduction in tariffs should take place at a faster rate for those that are at prohibitive level and that the guaranteed market access agreed to under the URAA should be expanded by increasing the minimum access quotas.

Export Competition

Export subsidies are an illegitimate policy instrument which are not allowed in the WTO rules for any other industry. Their use constitutes a source of trade distortion particularly given the increasing use of agricultural components in industrial products. These subsidies are no less objectionable for agriculture than they are for other industries and we believe there is no valid reason to keep them any longer.

It is particularly damaging and it creates unfair competition during circumstances like we have today with low grain prices, and different countries engage in a sort of subsidy war accelerating further price declines in the world market and leaving out of competition other countries that don't use any subsidies.

It should also be clarified that, during the implementation period and until they are finally eliminated, unused subsidies from one year can not be safe for subsequent years. Export taxes on food are as disruptive to the international trade as export subsidies. We believe that they should be phased out on the same criteria as the import tariffs.

Domestic Support

While the constraints on the level of domestic support through Aggregate Measure of Support (AMS) have done little by themselves to reduce the level of subsidies for agriculture, they have played an important role in the evolution of agricultural policy in the US, Canada, the EU and elsewhere. It is important that the progress in converting trade distorting support for commodities into non-trade distorting support for farmers, rural areas and the environment continue in the Millennium Round.

In this respect, the Green box should be analyzed and re-defined since presently contains a number of policy instruments which, while less trade-distorting than price or income support still encourage an expansion of agricultural output.

The issue of Multifunctionality has to be further clarified in the light of the existence of various and different interpretations on the concept and the possible implications it has for the WTO rules.

One thing is if it contemplates the social yearnings that must be dealt with in many societies and for which will have to find ways to accommodate these goals in a decoupled way compatible with free trade, and very different is if it shadows trade distorting agricultural policies.

The blue box, which contains the US and EU direct payments that were granted exemption from challenges under the Blair House agreement was in a way a need of its time, necessary to go ahead with the broader Uruguay Round package. However the policies of the US and EU are changing for internal reasons. The new US farm bill goes further than ever before to make the payment to farmers decoupled from output and therefore compatible with the green box, and a similar move is being considered by the European Union which would continue the reform started in 1992 and make the CAP consistent with enlargement.

The blue box then should essentially be phased out during the next round.

Sanitary and Phytosanitary Regulations

The SPS agreement regulates the movement of primary and processed products across international borders that are necessary to protect public health and the environment from pests, diseases and contaminants. However, these measures can and are being used to obstruct trade opportunities created by other trade liberalization policies.

This situation is of great concern for countries like Argentina and the United States, because they become major barriers for the expansion of trade opportunities and the welfare of our producers. One of the major challenges faced today by our Sanitary and Phytosanitary agencies is to assure an adequate level of protection from pests and diseases and at the same time maintain the ability to keep markets open and expand trade opportunities presented to us in a global economy.

The Agreement on SPS is grounded, as it should be in sound science. It is imperative that government regulations governing the safety of food be based not on consumer fears or perceptions, but on verifiable sound science. We understand that regardless of whether a particular food or production method is safe some consumers will demand the right to know how the food was grown or processed. This is not an issue of science. It is an issue of labeling. We believe this consumers' right to know should be respected in ways that do not interfere with global trade.

Developing general guidelines of how information could be communicated to consumers without unduly affecting food processors or retailers, and without harming safe food produced by other methods would be another objective of the new round.

Biotechnology

At present there are about six billion people in the world, and some 800 million are not receiving adequate nourishment because they have too little income to buy food and too few

resources to produce it. By 2020 the world population will grow to almost 8 billion people and most of them will have enough income to afford adequate diets if sufficient food is available at reasonable prices.

If, however, supply constraints bring about a significant rise in the price of food widespread hunger and malnutrition will occur. This means that the world's output of food will have to expand dramatically in the next quarter century. Achieving this increase in output will require one of two things : either the land devoted to agricultural production will have to be increased substantially, or yields will have to increase on the same amount of land.

We are all aware of the general concern about the environmental impact caused by the cutting of forests to expand cropland area and by desertification. In many countries there is evidence of erosion, salinization and soil depletion due to the expansion of farming into areas unsuited for intensive cultivation and the use of unsuitable or unsustainable farming methods.

Thus, a major task of the agricultural and biological sciences is to increase yields, improve plant characteristics and lower production costs within a system that is environmentally sustainable.

The use of biotechnology not only will contribute to increase the crop yields around the world by neutralizing the effect of diseases and pests that harm them during growth and after harvest but also by increasing the health-enhancing characteristics of commonly consumed food.

It also has the benefit that even small farmers in developing countries can take advantage of this new technology.

We believe then, that the use of biotechnology to improve plants is a significant development in the field of plant science. It promises major benefits to producers and consumers in developed and developing countries. It is true that new technology may have risks, we believe that safety and regulatory procedures can control these risks and make sure that the benefits heavily outweigh any possible costs.

It is then important that all countries agree that a full science based assessment to determine the safety of using plants produced with modern biotechnology is essential and that a mutual recognition of approval processes in countries with the desired level of scientific assessment and mutual recognition agreements among governments be developed as soon as possible.

State Trading Enterprises

There is a widely spread concern on the lack of transparency in the pricing and operational activities of the STEs whether they are state trading importers or state trading exporters. State trading entities with special or exclusive rights to import are extension of the market access problem. Similarly, state trading entities with special or exclusive rights to export are extensions of the export subsidy problem. We believe, that over time all state trading should be dismantled.

Ladies and gentlemen : we have the legitimate aim that agriculture should be fully incorporated to the same disciplines and concessions of the industrial products and that we cannot

wait for a 3rd. round to see the results of it.

The time has come for policy makers to accept the challenge and the responsibility to move forward and accomplish a more equitable food distribution in the world.

Setting the Stages for new Trade Negotiations: Mexico's Perspective

Francisco J. Gurría Treviño
Under Secretary for Agriculture and Livestock
SAGAR, Mexico

22 February 1999

OVERVIEW

1 Mexico's Perspective for New Trade
Negotiations

2 Macroeconomic Indicators

3 The Agrifood Sector

4 Foreign Trade Policy

5 Total Foreign Trade

Mexico's Perspective for New Trade Negotiations

- α Mexico is a firm and strong believer of Free Trade Agreements.
- α Mexico sees Regional Trade Agreements (RTA's) as the way to build stronger Multilateral Trade Agreements (MTA's) in order to reach Global Free Trade Liberalization.
- α Mexico believes that the reduction of trade barriers, implies an increase in global welfare which in turn gives benefits for producers, consumers and nations.
- α This is due to the fact that worldwide production of goods shifts to the most efficient producers and, as a consequence, consumers benefit because of lower prices, availability, variety and better quality products.
- α For the Mexican economy, it is very important that its agrifood sector be strongly involved in both RTA's and MTA's, to make a better use of Mexico's agrifood sector competitive and comparative advantages.

Mexico's Perspective for New Trade Negotiations

- α Such kind of agreements have already given dynamism to the agrifood sector, as well as further access to technology, better quality inputs, capital investment and export opportunities and it has been a way to update and harmonize standards and regulations.
- α Mexico will be promoting in both RTA's and MTA's the total elimination of agricultural tariffs, the use of restrictions on sensitive products, the absence of export subsidies as well as the elimination or introduction of new tariffs that distortion trade.
- α Mexico will be asking the adoption of a 15-year phase-out of all tariffs (in the most sensitive products), quotas and licenses that are barriers to trade as well as a science based criteria for the adoption or implementation of technical barriers.
- α To carry out deeper discussions on the adoption of better commercial dispute settlement mechanisms, anti-dumping provisions, the use of unfair trade practices and the increment of the transparency of farm policies that allows to reduce trade-distorting effects.

Sociodemographic Indicators, 1998

INDICATOR	VALUE
Total area (km ²)	1'967,183
Population (million)	96.3
Men	47.5
Women	48.8
Urban Population (%)	70.8
Rural Population	29.2

Economic Perspectives

INDICATOR	1998	PERSPECTIVE		
		1999	2000	
Real GDP (%)	4.8	2.4	3.7	
Consumption (%)	6.3*	5.4	n.d.	
Investment (%)	16.8*	12.7	n.d.	
Unemployment Rate (%)	3.3	3.1	3.2	
Inflation Rate (%)	15.4	16.3	14.0	
Interest Rate (%), CETES 28 days	24.0	25.2	19.9	
Exchange Rate (pesos/dollar)	9.14	10.80	12.42	

Economic Indicators, 1998

INDICATOR	VALUE
<i>Active Economic Population (million)</i>	40.05
<i>Gross Domestic Product (million dollars)</i>	403,670
<i>Per Capita Product (dollars)</i>	4,194
<i>Mexico's Total Trade (million dollars)</i>	242,743.2
<i>Total Exports</i>	117,500.3
<i>Total Imports</i>	125,242.9
<i>Total Direct Foreign Investment (million dollars)</i>	9,806.0
<i>Increase Reserves (million dollars)</i>	2,137.0
<i>Daily Minimum Wage (dollars), 1999</i>	3.10
<i>Annual Average Nominal Wage (dollars), 1998</i>	3.25
<i>Exchange Rate to the end of the Period (pesos/dollar)</i>	9.90
<i>Inflation Rate (%)</i>	15.40

Source:Elaborated by the Agriculture and Livestock Undersecretariat-SA GAR with data coming from Bank of Mexico, SHCP, SECOFI, STPS & INEGI. 1998.

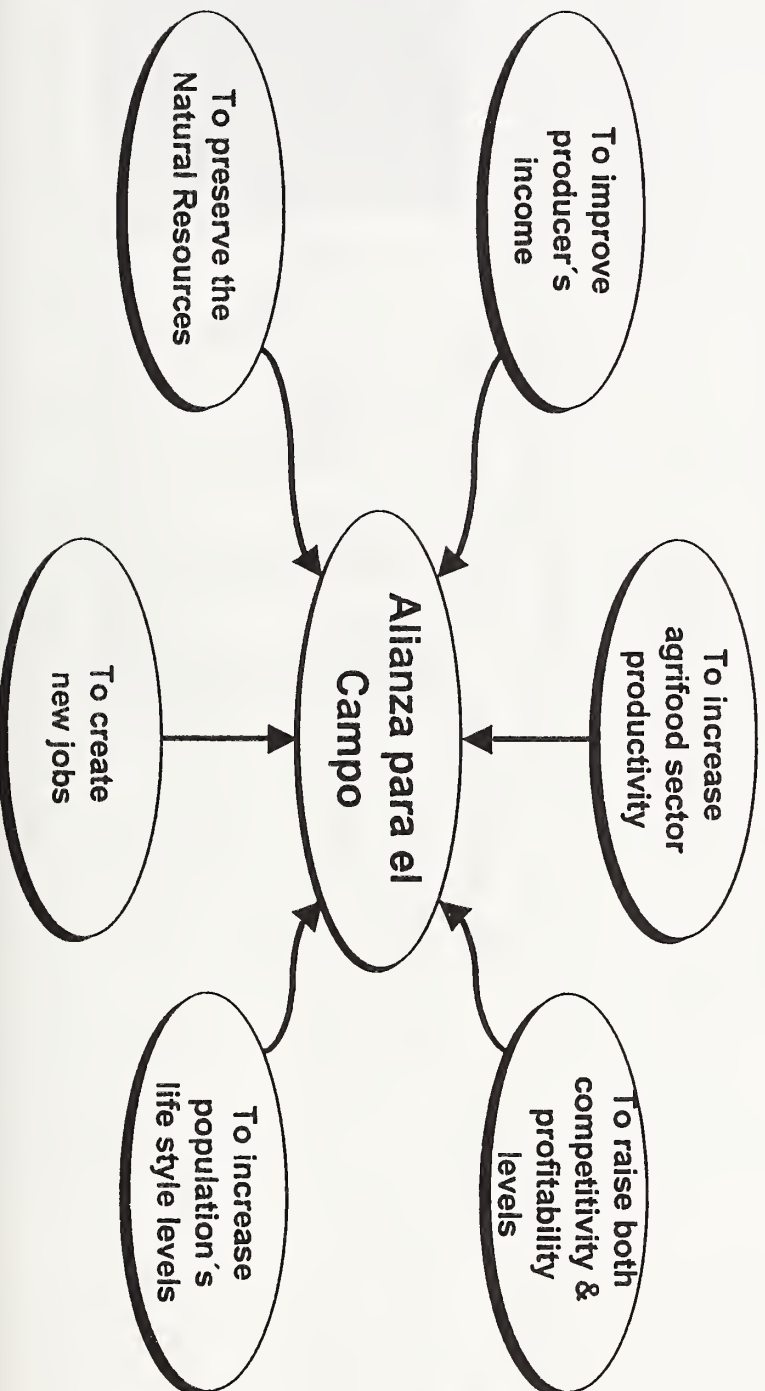
The Agrifood Sector and the State



The National Development Plan (PND) 1995-2000 recognizes the need to transform the government role in the Mexican agrifood sector.

This implies the creation of efficient markets within a well established regulatory framework.

Mexico's Agricultural Policy



Alianza para el Campo



- ✿ *Alianza para el Campo* is a development program which uses policy instruments in order to promote investment, technology transfer, research, extension activities, and export promotion.

Objectives

- ✓ To increase producer's income
- ✓ To correct agrifood trade balance
- ✓ To fight extreme poverty
- ✓ To preserve the Natural Resources

It stimulates the regional comparative advantages with the application of specific programs.

The Agrifood Sector

Sociodemographic Indicators

INDICATOR	VALUE
Total Area (million hectares)	88,550.30
Agriculture	21,317.710
Livestock	67,232.593
Population (million)	27.9
Men	14.1
Women	13.8
Age Distribution (%)	
0-14	34.2
15-64	61.2
+65	4.6
Life Expectancy at Birth (years)	73.6

Economic Indicators

INDICATOR	VALUE
Population occupied (million)	5.6
Share of GDP (%)	10.5
Agrifood Sector Total Trade (million dollars)	15,501
Exports	6,868
Imports	8,633
Oil Sector Total Exports (million dollars)	7,146.9
Direct Foreign Investment (million dollars)*	5,790.7

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Evolution of the GDP



The Gross Domestic Product for the Agrifood Sector had an annual increase of 11.1 % from 1993 to 1998.

Mexico's Foreign Trade Policy

Before the opening process...

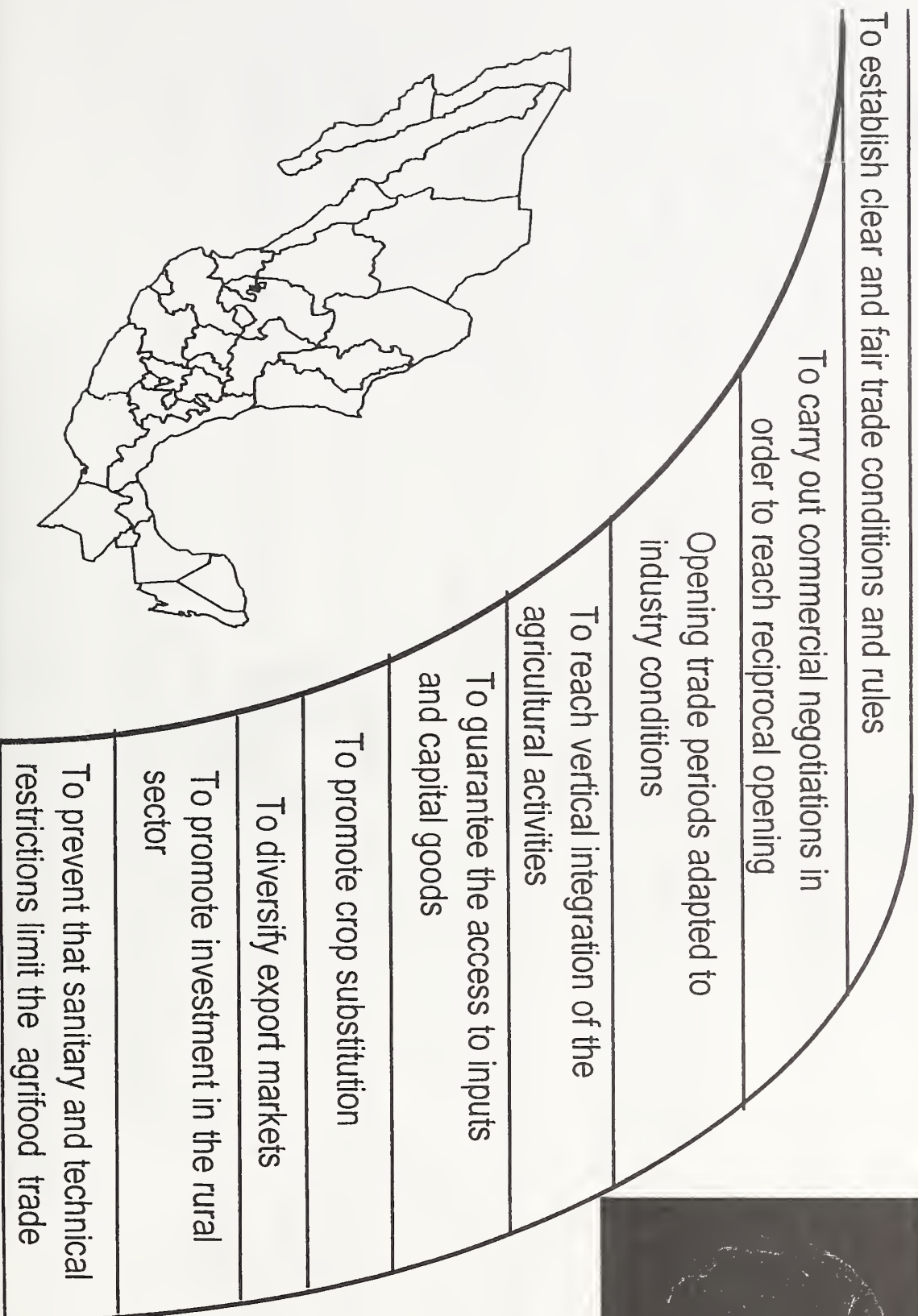
From 1950 to 1986, Mexico had an agricultural policy based on a closed economy with several gaps on sector's integration and in the commercial relationships.

The major impacts in the agricultural sector were on:

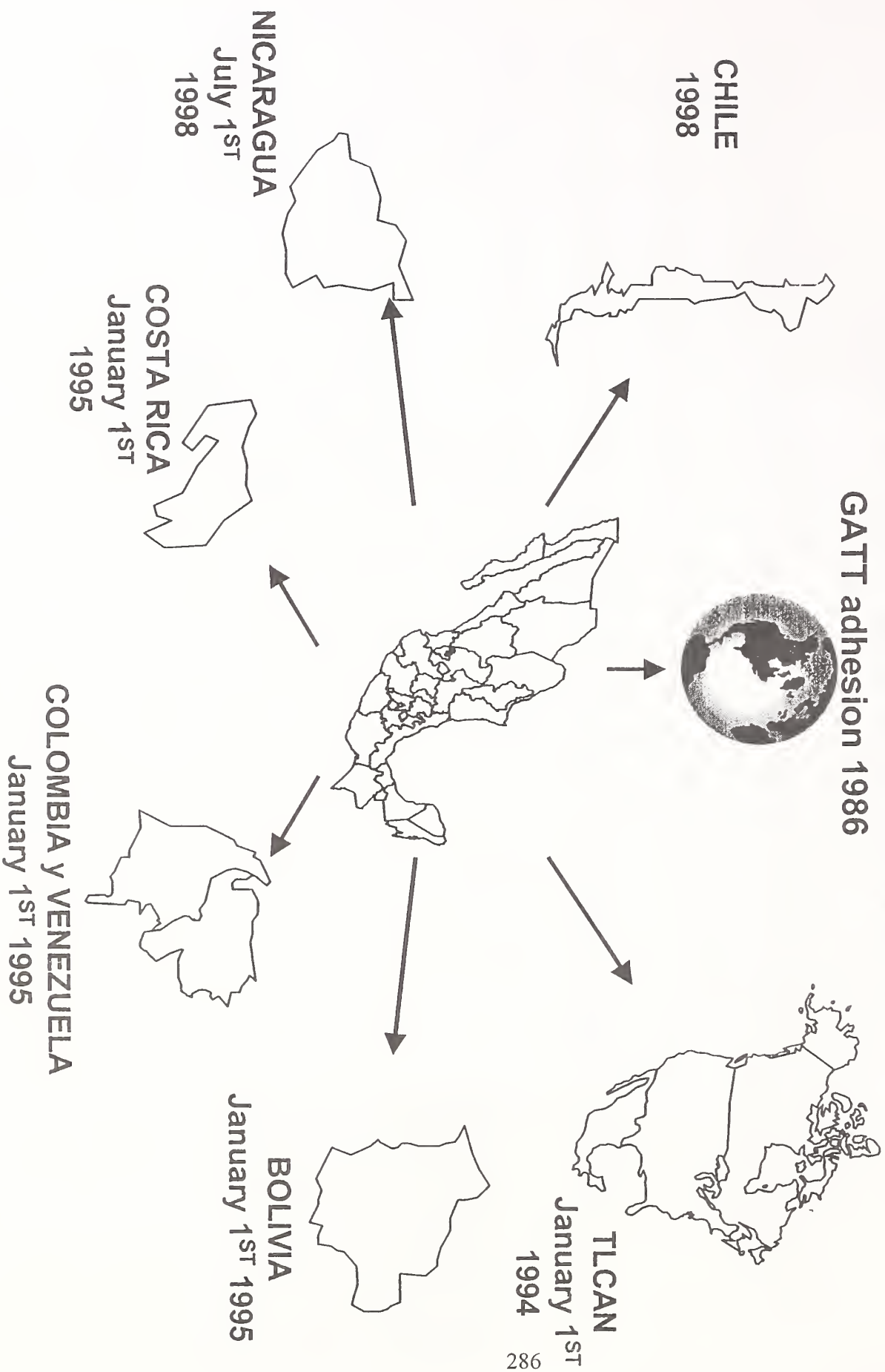
- The production growth rate, which was less than the population growth rate
- The Mexican Government, who operated several enterprises related with the sector.
- The market, whose adjustment price mechanism, was distorted by the subsidy policy and by the lack of exterior competition
- Lack of infrastructure, due to the absence of agricultural productive investment.



Goals and Strategies of Mexico's Foreign Trade Policy



Trade Agreements in Effect



Mexico's Foreign Trade Policy Schedule

Trade Negotiations in Process

α Free Trade Agreement with El Salvador, Guatemala and Honduras

α Bilateral Free Trade Agreements with Belize, Jamaica, Panama, Ecuador, Peru, Israel and Trinidad Tobago

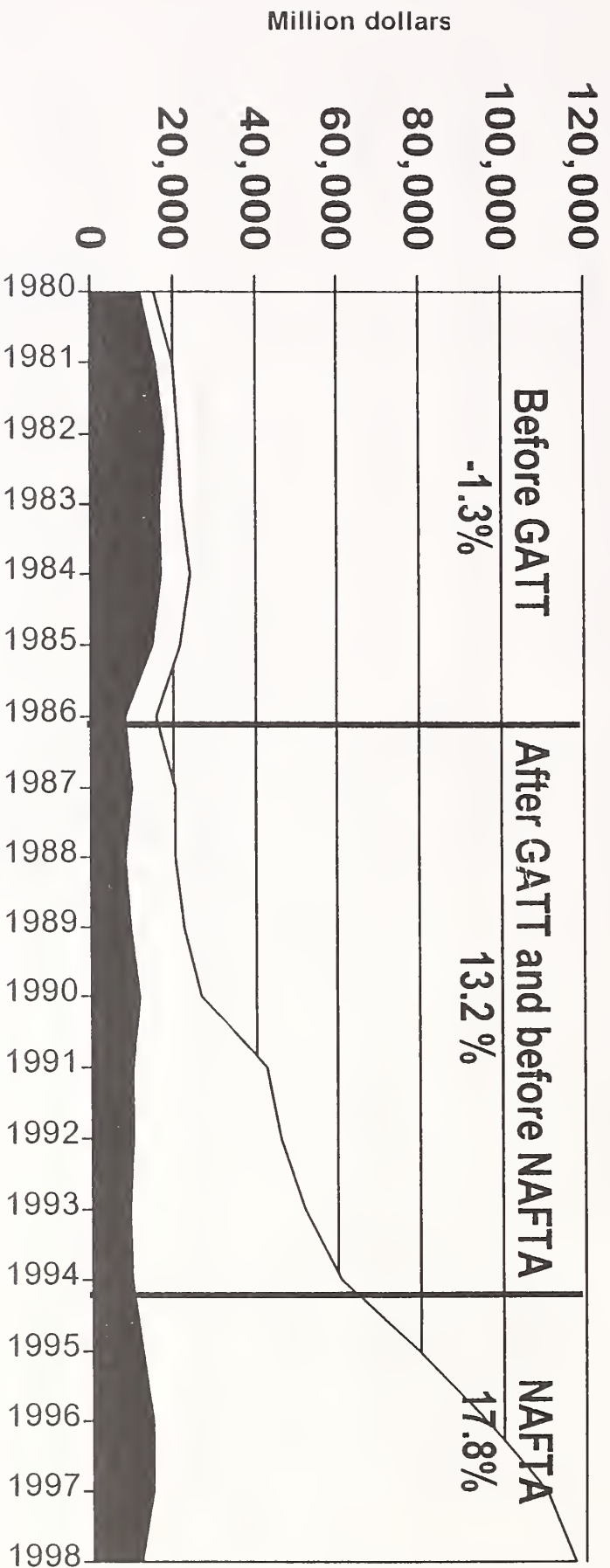
α Mercosur transitory Agreement with Argentina, Brasil, Paraguay and Uruguay

α Free Trade Agreement with the European Union

α Free Trade Agreement of the Americas

α Asia Pacific Economic Cooperation Forum

Opening Stages and Exports Growth

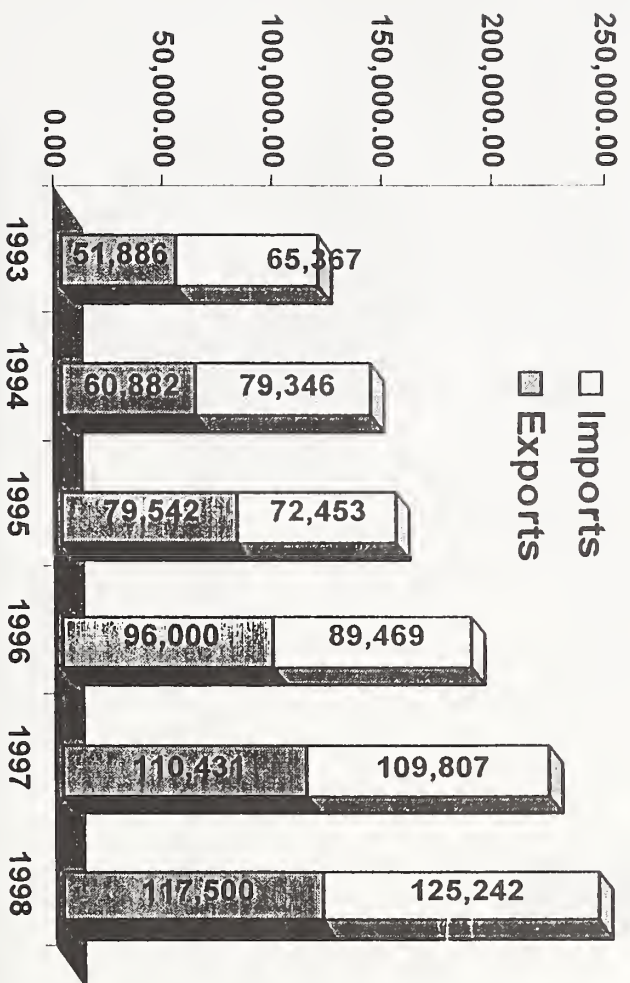


■ Agricultural ■ Oil ■ Mining □ Manufacturing

Annual Growth Rates				
STAGES	Agricultural_*/	Oil	Mining	Manufacturing
Before Gatt	-1.6%	7.1%	-11.9%	12.5%
Between Gatt and Nafta	7.5%	-8.7%	-5.6%	26.6%
After Nafta	9.6%	2.1%	7.7%	20.0%
				17.3%

Only primary industry

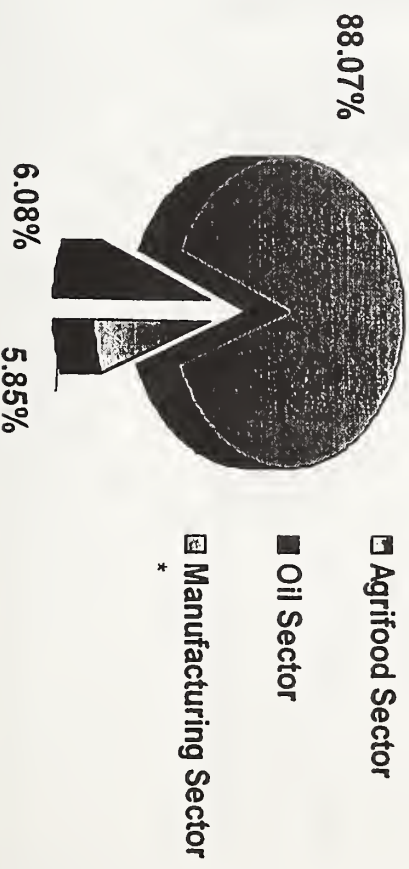
Mexico's Total Foreign Trade



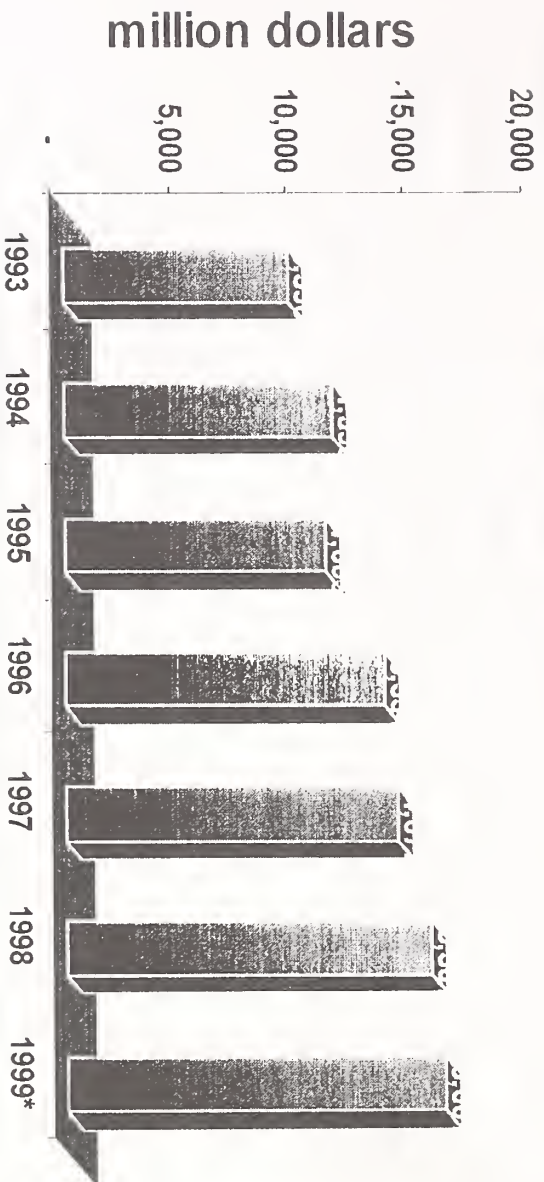
The value of the total foreign trade between Mexico and the rest of the world increased around 107% from 117,252 md in 1993, to \$242,742 md in 1998. The annual average growth rate for this period was 15.56%.

Percentage Share of the Agrifood Sector on the Total Export Value

In 1998, the agrifood sector represented 5.85% of the total export value. Such value was almost the one obtained by oil exports which accounted 6% of the total.



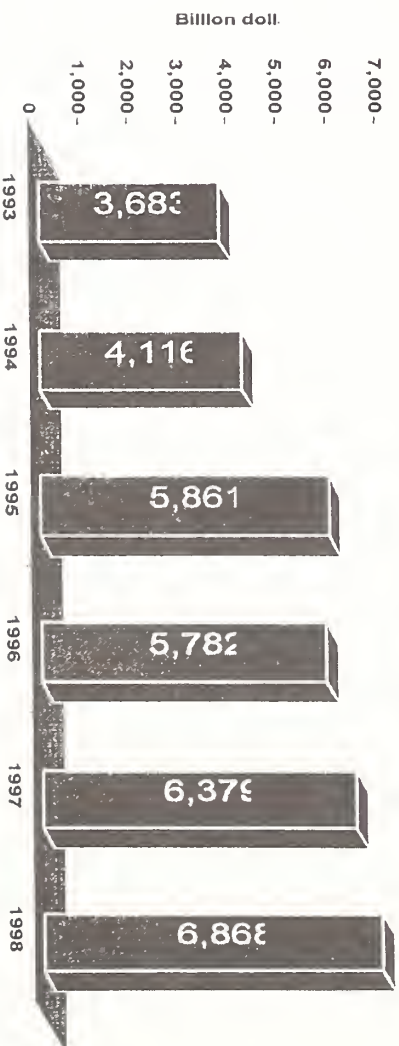
Mexico's Total Agrifood Foreign Trade



The value of the agrifood sector total trade between Mexico and the rest of the world increased around 61.50% from \$9,598 md in 1993 to \$15,501 md in 1998. The estimated value for 1999 is \$16,001 md

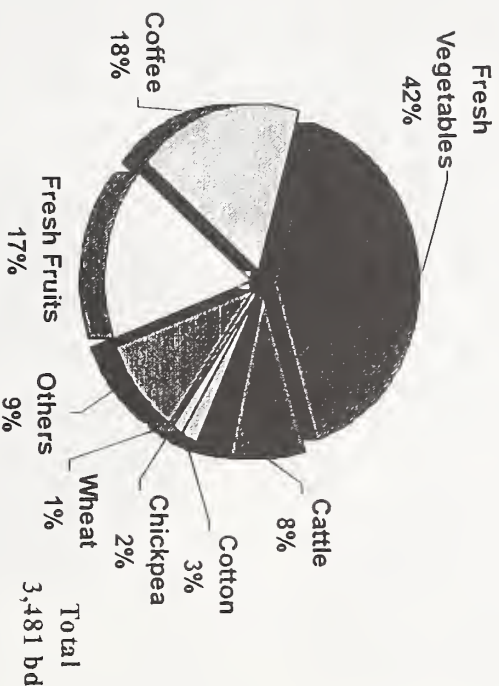
Mexico's Agrifood Exports

The value of the total agrifood exports to the rest of the world increased around 86.47% from \$3,683 md in 1993 to \$6,868 md in 1998. The annual average growth rate was 13.27%.



Main Agricultural Raw Exports

Average 1994-1998

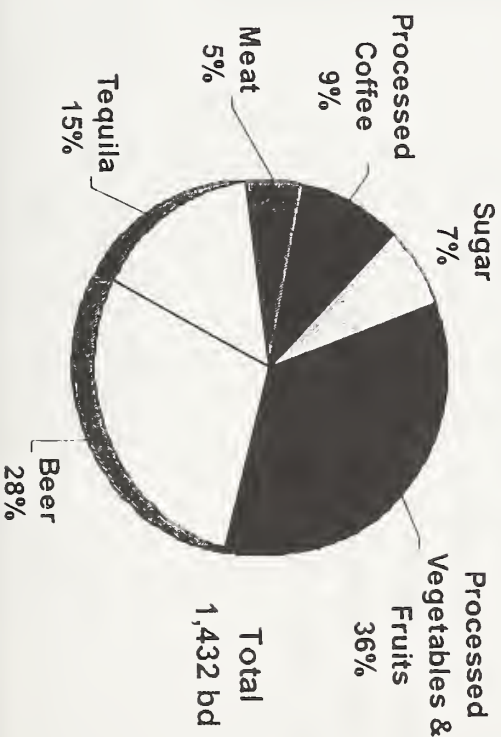


The average value of the Mexican agricultural processed products exported during 1994 -1998 was \$2,320 md. From this value, 40% of the total (\$928 md.), accounted for agricultural processed products.

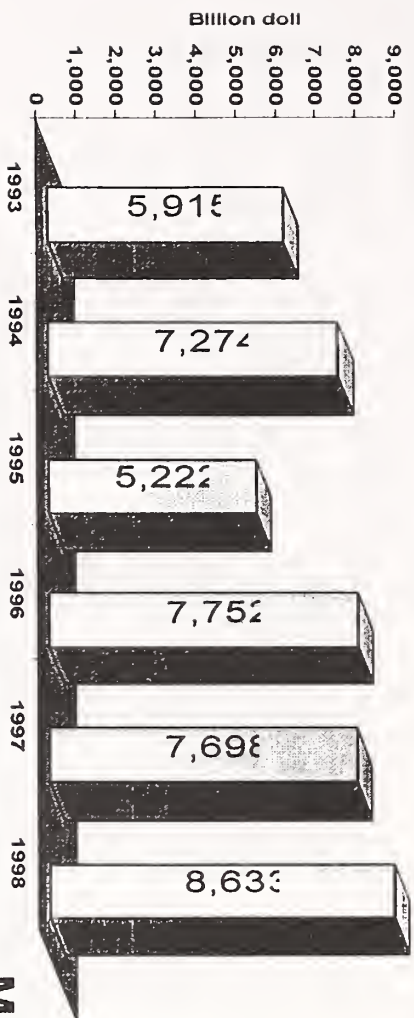
The average value of the Mexican agricultural products exported during 1994-1998 was \$5,801 md. From this value, 60% of the total (\$3,481 md), accounted for agricultural raw products.

Main Agricultural Processed Exports

Average 1994-1998



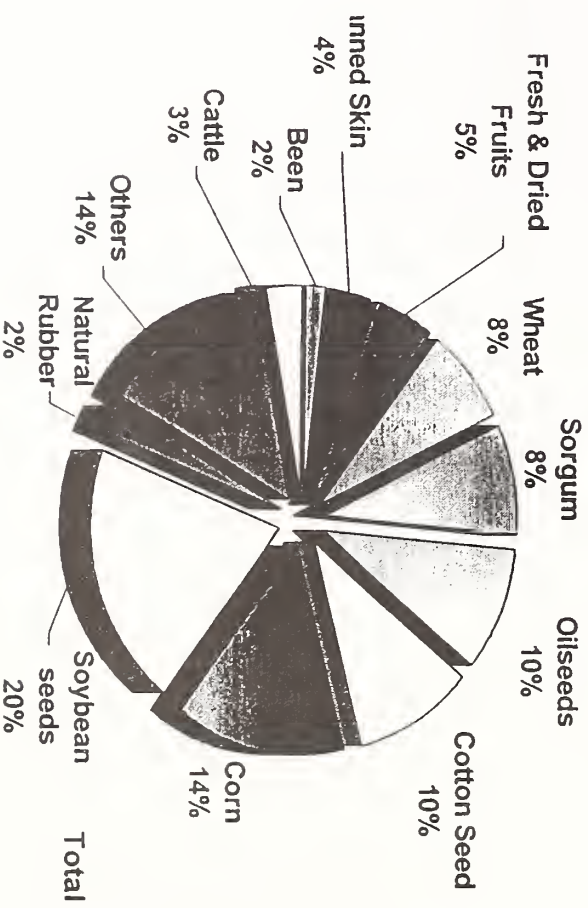
Mexico's Agrifood Imports



The value of the total agrifood imports from the rest of the world increased around 45.95% from \$5,915 md in 1993, to \$8,613 md in 1998.

Main Agricultural Raw Imports

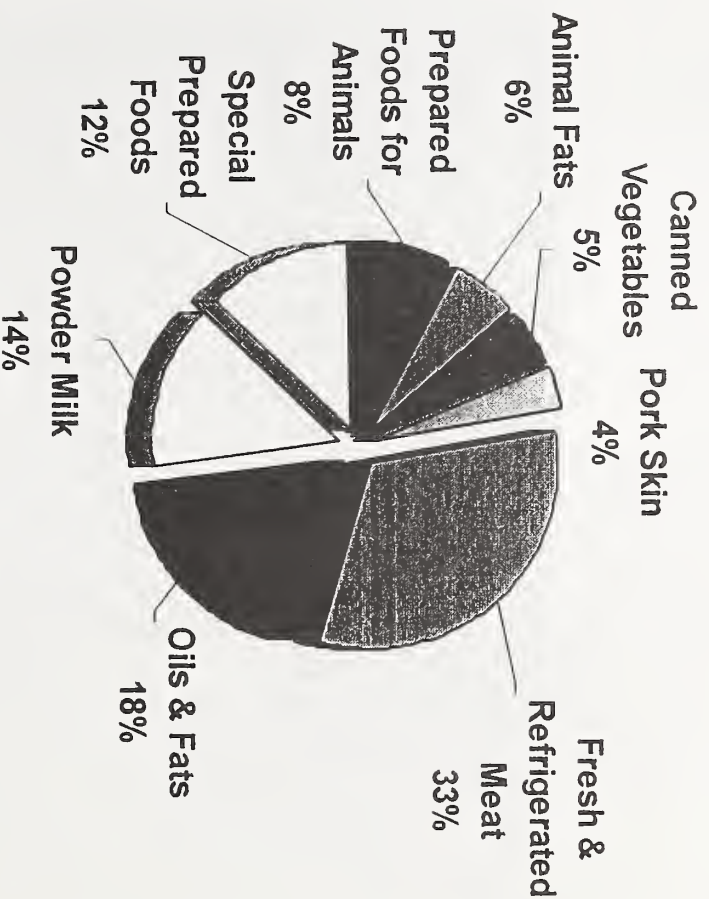
Average 1994-1998



The average value of the Mexican agricultural products imported during 1994-1998 was \$3,888 md. from this value, 53% of the total (\$2,060) accounted for agricultural raw products

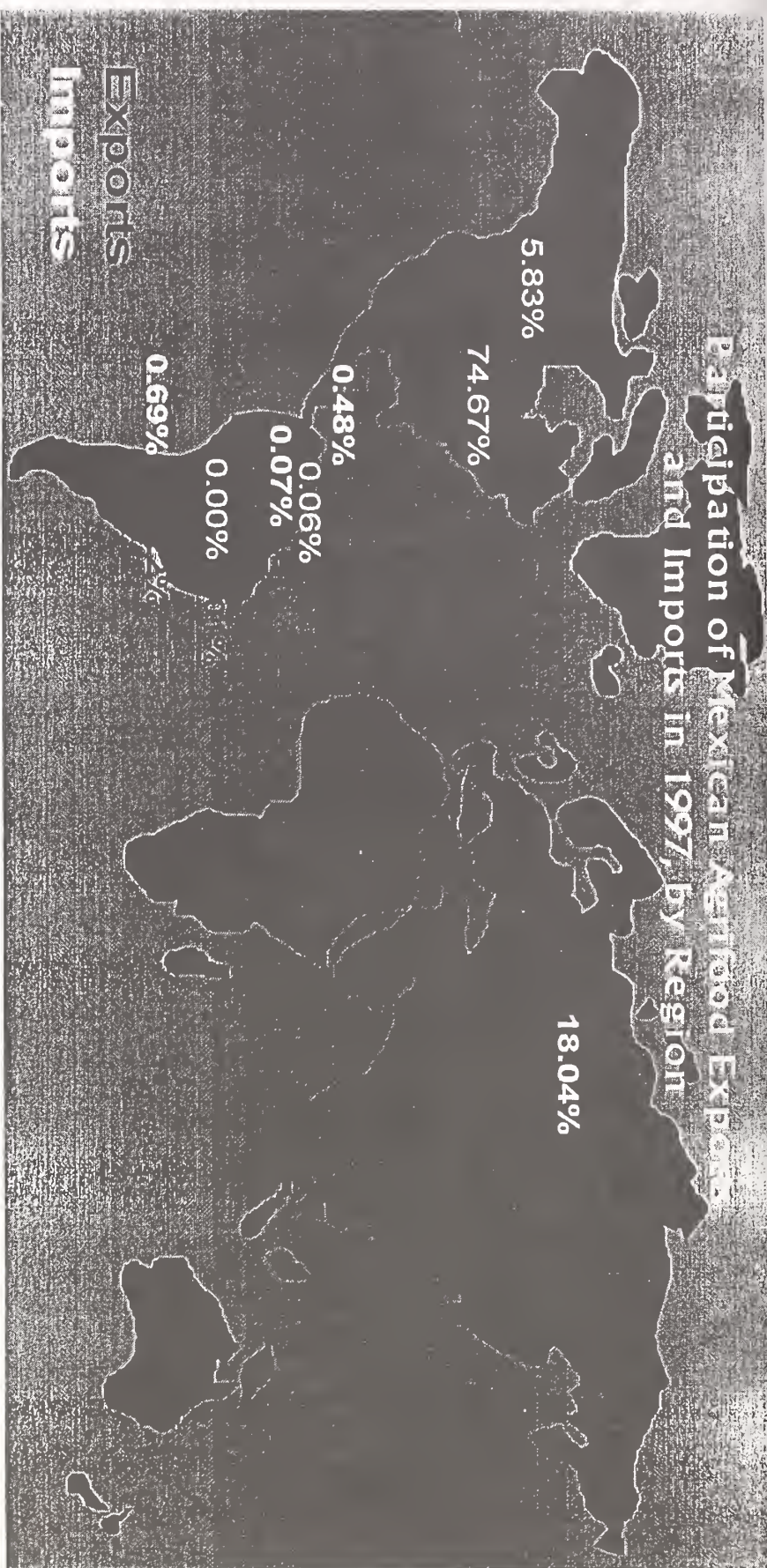
Main Agricultural Processed Imports

Average 1994-1998



The average value of the Mexican agricultural processed products imported during 1994-1998 was \$3,494 md. From this value, 47% of the total (\$1,642) accounted for agricultural processed products.

Participation of Mexican Agricultural Exports and Imports in 1997, by Region



Commercial Region	Exports	Imports
♦ TLCAN	75.93%	80.50%
♦ USA	75.22%	74.67%
♦ CANADA	0.70%	5.83%
♦ G-3	0.75%	0.13%
♦ COLOMBIA	0.40%	0.07%
♦ VENEZUELA	0.35%	0.06%
♦ BOLIVIA	0.01%	0.00%
♦ CHILE	0.22%	0.69%
♦ COSTA RICA	0.36%	0.48%
♦ RESTO DEL MUNDO	22.75%	18.04%

International Trade from U.S. Agriculture's Perspective

P. Scott Shearer
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The future economic well-being of American agriculture is closely tied to our competitiveness in an expanding global market. The importance of trade to the future of American agriculture has been emphasized under the 1996 Farm Bill, with the reduction in support of farm programs. U.S. producers will depend on exports for an estimated 35 percent of gross receipts by the year 2003. U.S. policy must reflect a strong commitment to expanding world markets.

The importance of trade is underscored by America's shrinking share of the world's population. Americans now comprise only 4 percent of the world's population and are experiencing minimal population growth, while many of the countries that we trade with are experiencing significant population growth. To add to this phenomenon, is the growing strength of the middle class. The power of emerging middle classes world-wide, made up of consumers with the ability to shift their consumption patterns, have become a critical factor driving consumer markets. In India, for example, there will be 115 million new members of the middle class by 2005. In China, there will be 196 million more members of the middle class by 2005. These new middle class consumers around the world represent a booming potential market for our farm products.

The Farmland System has developed business strategies revolving around expanding world markets. During the past six years, the Farmland System's international sales have grown from less than \$200 million to over \$4.1 billion. In Mexico, since the passage of the North American Free Trade Agreement (NAFTA), our trade has increased from less than \$50 million in 1992 to \$450 million in 1998.

Globalization is a fact, not a policy. It has been a fact for several years. Today, we can easily understand that information and knowledge is blind to national boundaries, language differences, and our own human uniqueness. The same is true for other items that are traded across borders. The thirst for a better life does not end at our borders, but begins at our shores. While there is qualified need to have a responsible trade policy; in the end, it is the desire and demand of the world's consumers which will determine the level of international integration we may reach.

Today, we must talk about establishing the trade agenda for tomorrow, the value and importance of trade to everyday people, and about defining the vision of trade as a sound, worth, and necessary long term policy.

As we begin 1999 and prepare to enter the 21st century, it is vital to our nation's farmers and ranchers that we build a freer and fairer world trade system. We must also realize that liberalizing trade allows markets to expand more rapidly.

The United States will host its first ever WTO trade ministerial in December this year in Seattle. This ministerial will serve as the beginning for the new negotiations on agriculture and other sectors in the WTO. The implementation of the Uruguay Round Agreement on agriculture provides for further negotiations in the areas of market access, domestic supports and export subsidies. Each commodity will have its specific recommendations, but let me outline the following items of common interest.

Agriculture supports comprehensive trade negotiations with the use of expedited action and timeliness for the conclusion with a single undertaking of the next round of negotiations. Agriculture supports:

- _ Elimination of export subsidies
- _ Tariffs must be further reduced
- _ State Trading enterprises must evolve to full price transparency and eventually to free market entities

The rules governing sanitary and phytosanitary measures must continue to be strongly based on science

Assure trade in genetically modified organisms is based on fair, transparent, and scientifically acceptable rules and standards

- _ Dispute settlement mechanisms must be shortened and there must be an end to the process. If countries are permitted to disregard dispute settlement findings, producers will not have confidence in the multilateral trading system

NORMAL TRADE AUTHORITY (FAST TRACK)

If American agriculture is to be successful in these negotiations it is critical that our negotiators have normal trade authority or fast track.

Every President has had this authority since 1974. It is important that this Administration and future Administrations have this full authority.

While the United States is waiting on the sidelines our competitors continue to enter into new agreements. In the Western Hemisphere alone there have been over 40 agreements and we are the party of two.

The Administration, Congress, and the business and agriculture communities must work together to support fast track.

America has been the world's leader in economic and trade policy for decades. The question before us is will we be the world's leader in the 21st century or will we give this role to our competitors.

SANCTIONS

A major issue for American agriculture is the proliferation in the use of unilateral economic sanctions by the United States. In the last five years, the United States has imposed sanctions approximately 60 times. These sanctions represent nearly 70 percent of the world's population and is estimated to cost the United States nearly \$20 billion.

Agriculture has felt the effects of embargoes and sanctions policy. The results have been the same: lost sales, lost market share, increased competition, and our reputation as a reliable supplier.

Sanctions cost U.S. agriculture \$500 million in lost exports in 1996. But more importantly, sanctions have removed 13.8% of the world's rice market, 9.8% of the world's wheat market, 4.8% of the world's vegetable oil market, 5.2% of the world's barley market, and 3.4% of the world's corn market from U.S. producers.

Agriculture strongly supports reforms in our nation's sanctions policy which includes:

- _ Exempt food, medicine, and agriculture from unilateral sanctions.
- _ Sanctions reform legislation proposed by Senators Lugar, Kerrey, and Hagel and Congressmen Crane and Dooley which establishes a framework for consideration of future U.S. unilateral sanctions. Before imposing a unilateral sanction, Congress and the President would be required to consider: the likely effectiveness of the proposed sanction; the objective of the sanction; economic costs for American agriculture and industry; and potential alternatives.

This will be a major trade issue for American agriculture. We believe that our foreign policy should promote American agriculture, not hurt American agriculture.

USDA PERSPECTIVE ON THE OUTLOOK FOR COTTON

Pete Burr, Stephen MacDonald, Leslie Meyer, and Carol Skelly
Agricultural Economists, USDA

World Cotton Situation for 1998/99

The world cotton situation for 1998/99 is characterized by falling production, consumption, and trade. However, concern has focused on falling consumption, and world prices have fallen to levels not seen since the early 1990's. World consumption is forecast at 84.6 million bales in 1998/99, 3.8 million below its year earlier level, the largest annual percentage decline (4.2 percent) since the early 1970's. World production in 1998/99 is estimated 6.7 million bales below its year earlier level, at 84.7 million. Higher world ending stocks are expected for the fifth consecutive year in 1998/99, 500,000 bales higher than a year earlier at 41.6 million bales, or 49 percent of world consumption.

Foreign Cotton Situation for 1998/99

Foreign Area, Yield and Production

Foreign cotton area rose slightly in 1998/99, up 1 percent to 28.5 million hectares. However, foreign production is estimated lower nonetheless, down 1.7 million to bales to 71 million. Foreign yields fell on average during 1998/99 since production declines were concentrated in countries where irrigated production and high yields predominate, and larger crops were recorded in countries with some of the lowest yields in the world.

Increased foreign area was led by India's 300,000 hectare gain as declining Indian stocks in 1997/98 fueled higher prices, driving area there to its highest ever. Australia's area increase was the second largest of any country in 1998/99 as favorable pricing opportunities against New York futures coincided with favorable water supplies. Timely precipitation and low grain prices discouraged wheat plantings in favor of cotton across an unprecedented amount of dryland area, and Australia's total cotton area is estimated to have risen 100,000 hectares, or nearly 25 percent. At 540,000 hectares, Australian area marked its fourth consecutive annual increase to a new all-time high. Finally, with increases in South Africa, Zimbabwe, and a variety of countries in West Africa's Franc Zone, cotton area in Sub-Saharan Africa rose 200,000 hectares from the year before, its fifth consecutive increase. With this increase, Sub-Saharan Africa's area reached a record 4.3 million hectares, surpassing the 4 million hectare record set in 1971.

Area fell 100,000 hectares in China, and nearly 100,000 hectares in Egypt, as government policy in each country helped reduce the attractiveness of cotton production. Adverse weather helped drive Sudan's area about 100,000 hectares lower as well, and the adverse economic events of the

last year contributed to lower area in Argentina and Paraguay.

Foreign production in 1998/99 is estimated lower than the year before as lower production in China, Egypt, Pakistan, and other countries offset larger crops in India, Australia, and Turkey. According to China's State Statistical Bureau's initial estimate, China's 1998/99 crop totaled about 19.8 million bales, 1.3 million below the previous year. Yields fell from the previous year's record high, but were the second largest ever. Xinjiang continued to account for an ever larger share of China's cotton crop, and its high yields supported national average yields despite the impact of the summer's floods in southeastern growing regions. The Egyptian government introduced several reforms in 1998/99--including reduced pesticide subsidies for farmers, liberalization of land rental rates, and reduced purchase prices--and the crop is estimated to have fallen nearly one-third, a 500,000 bale decline, due to lower area and the effects of excessive heat on yields. Weather and insect problems continued to weigh on Pakistan's yields, and Pakistan's 1998/99 crop was nearly 400,000 bales lower than the year before.

Foreign Consumption, Trade, and Ending Stocks

The economic slowdown triggered by the Asian financial crisis has taken a heavy toll on foreign cotton consumption in 1998/99. At 74.2 million bales, foreign consumption for the year is estimated to have fallen 3.9 percent, the largest such drop of the post-World War II era. With this 2.8-million-bale decline, foreign cotton consumption is now forecast to be at its lowest since 1985.

According to Oxford Economic Forecasting, world economic growth is estimated at barely 2 percent in both 1998 and 1999, substantially lower than average 3.2 percent world GDP increases of the preceding four years. Southeast Asia is expected to improve in 1999, and suffer only a 1-percent decline in GDP, compared with its 6.7 percent contraction in 1998. Deterioration is expected for the transition economies, where average GDP growth is expected to go from -2.3 percent in 1998 to -7.3 percent in 1999, as the Asian crisis's delayed impact hits Russia. Similarly, a Brazilian economic contraction in 1999 is expected to bring total Latin American GDP growth to its lowest in four years. Finally, Japan's economy is expected to contract for the second consecutive year in 1999.

As a result, reduced consumer demand in Southeast Asia, Japan, Russia, and Brazil appears to be offsetting what to date has been relatively robust consumer demand in the United States and Western Europe. Textile exports that would otherwise be going to Japan, Russia, and Brazil have in effect been diverted to other markets, and textile products that would have otherwise met domestic needs in Southeast Asia have moved onto export markets, further heightening the competition in markets that can still import.

Consumption in both China and Turkey is expected to be 1 million bales lower than the year before under the impacts of slowing domestic economies, poor growth in major textile export markets, and increased competition from other textile exporters. China's calendar 1998 textile and apparel export value fell 7.3 percent from the preceding year, and a successful implementation of the on-again, off-again spindle-reduction campaign China has pursued for many years reportedly led to the destruction of millions of cotton spindles during calendar 1998.

India's consumption is forecast nearly 600,000 bales below the year before due both to its own slowing economy and to difficult competition in world textile trade from East and Southeast Asian exporters. Domestic economic problems associated with the aftershocks of the Asian financial crisis have reduced expectations for economic growth and cotton consumption in Russia and Brazil, with respective year-to-year declines in consumption of 350,000 and 150,000 bales.

Foreign cotton imports are also expected to decline in 1998/99, down 2.6 million bales to 24.1 million. Not surprisingly, the countries with the largest expected consumption declines are those with the largest expected declines in imports. China's imports are forecast 1.2 million bales lower than the year before; Turkey's imports, 1.1 million bales lower; and Brazil's and Russia's each about 400,000 bales lower. Smaller increases in imports are foreseen for India, Pakistan, Bangladesh, and Southeast Asia.

As foreign consumption slows more than exports in 1998/99, foreign stocks are expected to increase. Virtually all of the anticipated 1-million-bale increase in foreign stocks is expected to occur in India. The combination of slowing consumption, rising production, and increased imports is expected to lead to a 1.2-million-bale increase in India's stocks, and the highest ending stocks-to-use ratio there since 1985. Lower stocks are forecast for China for the first time since 1993/94, but only a 250,000-bale decline. Egypt's cotton stocks are forecast nearly 400,000 bales lower, accounting for about half of the 250 percent increase in stocks that occurred between 1995 and 1997.

U.S. Cotton Situation for 1998/99

U.S. Area, Yield, and Production

U.S. cotton production in 1998/99 is currently estimated at 13.8 million bales, compared with last season's 18.8-million-bale crop. This season's U.S. production decline was the result of lower planted area, harvested area, and yield. Planted area of 13.4 million acres was 3.5 percent below the preceding year due to more attractive alternative crops and adverse weather at planting time, especially in the Southwest and West regions. Upland area totaled nearly 13.1 million acres while the extra-long staple (ELS) acreage expanded to 330,000 acres. In addition, this season's drought conditions forced producers to abandon 20 percent of the area planted, a much larger than normal abandonment. Estimated harvested area of 10.7 million acres reflects a 23-percent reduction from 1997/98. And despite the loss of lower-yielding dryland acres, the national yield of 618 pounds per harvested acre is 8 percent lower than a year ago.

Upland production is estimated at 13.37 million bales this season, with an average yield of only 612 pounds per harvested acre. With U.S. production substantially below last season, each of the four cotton regions produced a smaller crop than in 1997/98, the result of lower area and yields in three of the four regions. Only the Southwest planted more upland acreage in 1998/99 than in 1997/98. However, excessive heat and drought conditions in this region caused a record 41 percent abandonment rate, leaving the Southwest's harvested area at a historical low 3.4 million acres. As a result, a larger percentage of the Southwest crop was under irrigation in 1998/99 which bolstered the region's yield to 510 pounds per harvested acre.

In the Delta, cotton planted area, at 3.2 million acres, continued its 3-year decline as competing crop prices took acreage out of cotton once again in 1998/99. And with yields significantly below the previous season, upland production in the Delta reached only 4.2 million bales, the lowest in 10 years. In the Southeast, 1998/99 planted area was above the 5-year average at 3.1 million acres. However, weather problems also affected yields in this region, forcing production to fall to 3.7 million bales, the lowest in 4 seasons. North Carolina was the only exception, however, as cotton area, yield, and production were higher than last season. In the West, upland area fell below a million acres for the first time since 1967/68 as a result of weather problems at planting time. In addition, yields fell to 943 pounds per harvested acre for an upland crop of only 1.8 million bales for the region, the lowest in over 25 years.

Meanwhile, ELS cotton production is estimated lower this season at 430,000 bales. The decline in the ELS crop is attributable to a decrease in both harvested area and yields. Harvested area totaled 237,000 acres while the ELS yield averaged 873 pounds per harvested acre. With ELS production reduced over 100,000 bales this season, California continues to increase its dominance of the ELS crop, accounting for 80 percent of the 1998/99 production.

U.S. Mill Use, 1998/99

U.S. cotton mill demand is expected to decline in 1998/99 despite the continued strength in the retail market for cotton products. Much of the consumer demand, however, has been filled with less expensive imported textile products from many countries still struggling with recent economic crises. As a result of these textile imports, U.S. mills have been forced to curtail production to alleviate the buildup of inventories.

U.S. cotton mill use is projected to fall nearly one million bales this season to 10.4 million, 8 percent below 1997/98's 50-year high. Upland mill use is expected to approach 10.3 million bales while ELS consumption is projected to reach 110,000 bales. During the first 5 months of 1998/99, U.S. mills used 4.3 million bales of cotton, about 9 percent below the comparable period for 1997/98. And despite seasonal slowdowns seen in recent data from the Department of Commerce, the seasonally adjusted annual rate of cotton consumption has averaged over 10.5 million bales for the August through December period.

Slower growth in the U.S. economy, reduced U.S. supplies, and the rising textile imports, which have widened the cotton textile trade deficit, will help moderate mill use this season. And despite lower manmade fiber prices, declines in cotton mill use have been exceeded by decreases in manmade fiber usage. As a result, cotton has averaged nearly an 80-percent share on the cotton spinning system during the first 5 months of 1998/99, compared with 78.5 percent for the entire 1997/98 season.

U.S. cotton textile imports, textile exports, and the net trade deficit all rose in calendar 1998. Cotton textile imports increased nearly 20 percent and approached 6 billion pounds, or the equivalent of 12.5 million bales of raw cotton. On the other hand, U.S. cotton textile exports in 1998 gained over 10 percent reaching approximately 2 billion pounds, or the equivalent of 4.2 million bales of cotton. And as a result, the cotton textile trade deficit has risen substantially for the second consecutive year to a new record of more than 8-million-bale equivalents of raw

cotton. In total, U.S. consumers purchased the equivalent of over 19 million bales of cotton in calendar 1998, which indicated a rise of 1.5 pounds in the per capita consumption of cotton to 34 pounds, the highest in 55 years.

U.S. Exports, 1998/99

Like mill consumption, U.S. cotton exports have been restrained this season. U.S. exports are projected to fall 44 percent from last season's 7.5 million bales to only 4.2 million, the lowest level since 1985/86. Upland exports are forecast at 3.9 million bales while ELS shipments are expected to reach 300,000 bales in 1998/99. The reduction is attributable to the decline in the U.S. crop, which has left exportable supplies at a minimum, and to very weak worldwide import demand for cotton.

In addition, other major cotton exporters are generating strong competition for limited markets as foreign stocks outside China are projected to increase once again this season. In other words, the stocks of nearly all of the U.S.'s major competitors and most of our customers, are estimated to rise collectively by more than one million bales. And by the end of this season, these stocks are expected to be the highest since 1974/75, no doubt a major reason why demand for U.S. cotton is at a 10-year low.

During the first half of 1998/99, U.S. cotton exports totaled about 2.8 million bales, or a shipment average of 106,000 bales per week. With two-thirds of the forecasted exports already shipped, U.S. exports for the last half of the season need to average only 56,000 bales per week. Meanwhile, commitments (shipments plus outstanding sales) at the halfway point stood at nearly 4 million bales, or 95 percent of the forecast. However, sales beyond the 4.2-million-bale level are needed as some sales are traditionally "rolled over" to the new season. In addition, these remaining export sales will have to be made without the support of the "Step 2" competitiveness program, which expired in mid-December.

U.S. Imports and Ending Stocks, 1998/99

With the expiration of "Step 2" and the continued price gap between the U.S. quote and the A-index, the required 10-week count for triggering the "Step 3" import quota is approaching. The first quota is expected to open about March 1 with a quota quantity of approximately 200,000 bales. But despite the possibility of numerous quotas triggering, the likelihood of raw cotton imports of only about 350,000 bales is projected for the 1998/99 season. These raw cotton imports are largely the result of the small U.S. crop which was lacking in certain qualities of cotton needed by U.S. mills.

Despite projections of total demand for U.S. cotton to fall over 22 percent from 1997/98 to 14.6 million bales, demand remains above the reduced crop and stocks are expected to decline from beginning levels. Even including the projected imports, stocks at the end of 1998/99 are forecast to be only 3.4 million bales. Although the actual stock level is below the previous season, the ratio of ending stocks to total use has in fact risen from about 21 percent to over 23 percent this season, and, accordingly, prices to date have fallen.

The combination of the current low prices and low yields will reduce 1998/99 market revenue per acre to its lowest level in over 10 years, but government payments (including contract payments) will provide an average of almost \$120 per planted acre--before crop loss payments are factored in. Government outlays for the cotton program, which tend to rise as prices fall, will exceed \$1.5 billion for the current fiscal year. With the marketing loan differential running at about 10 cents per pound, most of this year's upland cotton production of 13.4 million bales is likely either to enter the loan or receive a loan deficiency payment (LDP). As of early February, nearly 5.0 million bales had entered the loan and nearly 6.0 million bales had earned an LDP.

World Cotton Outlook for 1999/2000

World ending stocks are expected to rise in 1999/2000 as production continues to exceed consumption. The outlook is for larger world production--at 86 to 88 million bales--led by a rebounding U.S. crop, and a similar gain in consumption--to 85 to 87 million bales. At the midpoint of these ranges, world ending stocks--even after excluding China--are expected to climb to their highest share of consumption since the mid-1980's.

Foreign Production for 1999/2000

Foreign cotton production for 1999/2000 is expected to decline by 1 to 2 million bales as smaller crops in China, India, Turkey, Mexico and Australia offset increases in Uzbekistan and the African Franc Zone.

An expected decrease of more than 1 million bales in China's cotton production--to around 18.5 million bales in 1999/2000--accounts for most of the anticipated drop in 1999/2000 foreign production. The Chinese government continues to implement policies designed to lower cotton area and production through reductions in procurement prices. However, many officials are pessimistic about the government's efforts since cotton still remains one of the best cash-earning crops in many parts of China. India's cotton output in 1999/2000 is also expected to be lower based on reduced area as many growers switch to alternative crops due to weakening returns this year as production soars and consumption contracts. Similarly, lower area in Turkey is likely to result from the current depressed conditions in the Turkish textile industry. Cotton area in Mexico is likewise expected to respond to weak demand and competition from competitively priced U.S. cotton. And marginal decreases in Australia's production are projected, as normal rainfall would reduce the potential for dryland cotton.

Two major foreign cotton-producing regions, Central Asia and the African Franc Zone, are likely to increase cotton production next year, despite the current low level of world cotton prices. With area unchanged based on government-set targets, Uzbekistan's cotton production is expected to rebound from this year's weather-reduced crop. Production in the African Franc Zone, where investment in cotton production will maintain area, is also likely to benefit from a return to normal yields.

World Consumption and Trade in 1999/2000

World cotton consumption is forecast to rise 1 to 2 percent from its year earlier level in 1999/2000 as world economic activity improves late in calendar 1999 and during 2000. However, at 85 to 87 million bales, world cotton consumption is still forecast at one of its lowest levels of the decade. Most of the expected continued problems with consumption can be ultimately traced to sluggish economic growth. During the last 25 years, cotton consumption has failed to grow when world GDP growth was below 2.3 percent. (The correlation is clearest when GDP for the calendar year occupying the latter part of the cotton marketing year is used: e.g., GDP in calendar 1998 is relevant to cotton consumption in marketing year 1997/98).

Currently, a modest upturn in economic activity in the year 2000 is foreseen. The U.S.'s phenomenal consumer demand growth is expected to weaken through 1999, picking up only slightly in 2000. Western Europe's consumer demand is expected to be relatively steady through this period. And there is a great deal of uncertainty about the outlook for Japan as it enters the eighth year of its post-"bubble" slowdown. Largely depending on expectations for Japan, various macro-economic forecasters expect either little change or a slight improvement in average economic conditions in developed countries.

For developing countries, the outlook is much better. A more optimistic outlook through 2000 is appropriate given recent events: improving stock markets in developing East and Southeast Asian countries, the return of South Korea's credit rating to investment grade, and the beginning of increased imports across several countries. GDP growth in Asian developing countries is expected to rise substantially in 1999 compared with 1998--albeit GDP growth will simply be less negative in Southeast Asia, but even there a strong upturn is likely in 2000. Little change is expected in China.

Several factors are expected to restrain global consumption growth. One is possible continued inventory adjustments. As a speaker at last year's Outlook Forum noted, changing economic conditions can amplify effects on fiber demand due to changing stockholding through the textile marketing chain. This has probably been a factor in 1998/99's extraordinary consumption decline, and lagged effects could continue in 1999/2000. Another factor is competition from low polyester prices. Price declines for polyester in most Asian markets reported by Cotton Outlook have exceeded the similar year-to-year decline in the A-index, and appear to be reaching new lows. As a result of these offsetting factors, expected world consumption gains in 1999/2000 are forecast at the long-term growth rate of 1 to 2 percent.

Just as 1999/2000 world consumption is not expected to rebound completely from 1998/99's large decline, world trade is not expected to completely recover from this year's losses. The circumstances that led to two of the largest import cuts--China's and Turkey's 1-million-bale import contractions--are unlikely to reverse, and the decline in Brazil's exchange rate is likely to lead to a still smaller share for imports there. Other importing countries are likely to increase imports slightly, however, and world trade is likely to again equal about 30 percent of world consumption, or about 26 million bales.

U.S. Cotton Outlook for 1999/2000

U.S. Area, Yield, and Production

Preliminary estimates for 1999 U.S. area suggest an increase to about 13.5 to 14 million acres, including about 275,000 acres of ELS cotton. And with average abandonment and normal yields, a U.S. cotton crop of 17 to 18 million bales is indicated, including 550,000 to 600,000 bales of ELS cotton. The mid-point of this range, 17.5 million bales, is more than 3.5 million bales above the 1998/99 weather-plagued crop. However, these estimates are at best an indicator of direction, given the uncertainties surrounding producers' planting intentions and yield variabilities across the Cotton Belt.

U.S. planted acreage is expected to rise marginally in all regions. Cotton area is likely to increase despite the current very low cotton price levels because of depressed prices for alternative crops, concerns about aflatoxin in corn, and the safety net provided by the cotton marketing loan program. December cotton futures fell below 60 cents per pound on February 11, its lowest level since November 1993; however, a comparison of the ratios of cotton prices to corn and soybean prices for the past several years shows that alternative crop prices are also extremely low. The results of a long-term research program by USDA's Economic Research Service on changing producer responses to prices under the 1996 Farm Act indicates that shifts from other commodities to cotton due to relative prices will more than offset the negative effect of current low cotton prices.

Cotton planted acreage in the Southeast and Delta is expected to reverse its recent pattern of decline due to shifts in acreage from other crops, especially corn. Last year's heavy corn price discounts due to aflatoxin infestations in the Delta have generated renewed interest in cotton. In the Southwest, reduced plantings of Pima cotton are likely to be offset by a gain in acres from grain sorghum. And in the far West, upland cotton acreage is likely to about equal last year's weather-reduced level. Some upland cotton acres will shift to Pima cotton in California, due to relatively stable prices and good yields.

U.S. Mill Use, 1999/2000

On the demand side, U.S. GDP is expected to grow more slowly in both 1999 and 2000 than it has in recent years. As a result, slower growth in retail cotton consumption, coupled with increased cotton textile imports, will likely result in mill use exhibiting little change in the upcoming season. U.S. retail cotton consumption could exceed 20-million-bale equivalents in 1999/2000 with only modest growth. However, as in the current season, much of this growth will likely be satisfied with textile imports. An offset to some of the growth in textile imports will be provided by the expected increase in cotton textile exports, largely attributable to NAFTA and CBI gains. Given the effects of ongoing trade liberalization, cotton textile trade will likely continue to expand and play a major role in the quantity of cotton demanded by U.S. mills.

Based on current indications, U.S. cotton mill use in 1999/2000 is likely to range somewhere between 10 and 10.5 million bales, about unchanged from 1998/99. However, the recently released GDP data for 4th quarter 1998 was a pleasant surprise to many, the highest quarterly growth in over 2 years. And if growth continues near this level, retail demand for cotton may rise further, which in turn could push mill use higher than currently projected.

U.S. Exports and Ending Stocks, 1999/2000

With higher production, the U.S. is potentially a larger exporter in 1999/2000; but, relatively weak world demand, some export competition from China, and continued large stocks in foreign countries outside China are major factors that will limit U.S. exports from returning to the shipment level of 1997/98. Exports in the range of 5 to 6 million bales are consistent with the world projections outlined here. The mid-point of this range, 5.5 million bales, would be 30 percent above the current season's projection but well below the 5-year average of approximately 7 million bales.

At 5.5 million bales, the U.S. share of world trade would rise above this season's 17.5 percent to about 21.5 percent, but would remain below the 25-percent average of the early 1990's. Under the standard assumption of no policy changes, this analysis assumes no revival of Step 2. The lack of Step 2, the prospect of continued low imports by China, continued exports by China, and rebounding production in Uzbekistan and the Franc Zone together suggest that the U.S. share of world trade should be below its average of the early 1990's.

And despite the projected increase in U.S. exports in 1999/2000, larger production gains are likely to push U.S. stocks higher. Based on these projections of cotton supply and demand, and the likelihood of negligible or no imports during the marketing year, U.S. stocks could rise nearly 2 million bales by the end of 1999/2000. The gain in stocks would imply nearly a one-third ratio of stocks relative to total use, well above this season and the highest in over 10 years.

So you might ask, "What does all this mean for cotton prices or farm income?" As you know, USDA and its employees are prohibited by law from public forecasts of cotton prices, but perhaps just as important as prices are the net income prospects. Based on the scenario presented here, there may be some good news on the horizon. This season, the cotton producer's income from the marketplace was severely reduced by the combination of low prices and low production. Only program payments, in place under the current farm legislation, kept producers' net income per acre above the recent low of the 1995 season. And for next season, current projections for net income for cotton are somewhat positive due to a projected return to normal yields, coupled with the promise of marketing loan benefits if low prices should continue. Although not expected to reach the peaks of recent years, a rebound after two years of decline will be welcomed by all segments of the cotton industry.

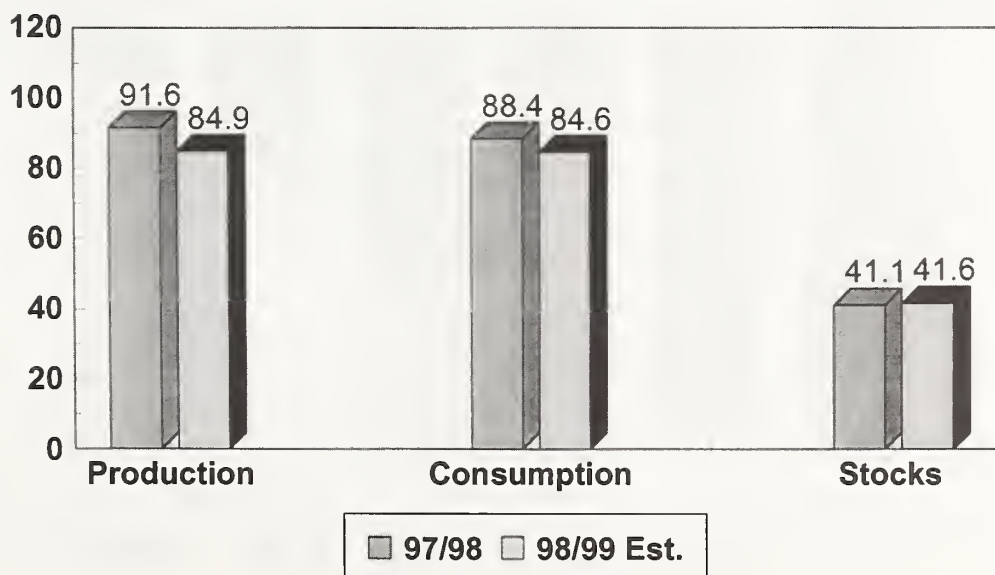
USDA Perspective on the Outlook for Cotton

Peter Burr, Stephen MacDonald, Leslie Meyer,
and Carol Skelly

USDA Agricultural Outlook Forum '99
February 23, 1999

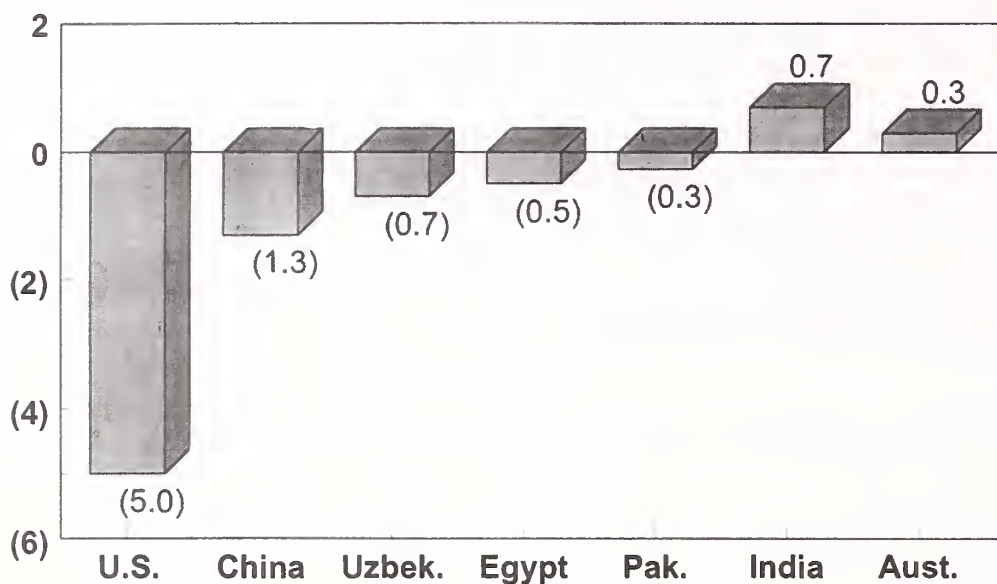
World Cotton Production, Consumption, and Stocks

Million bales



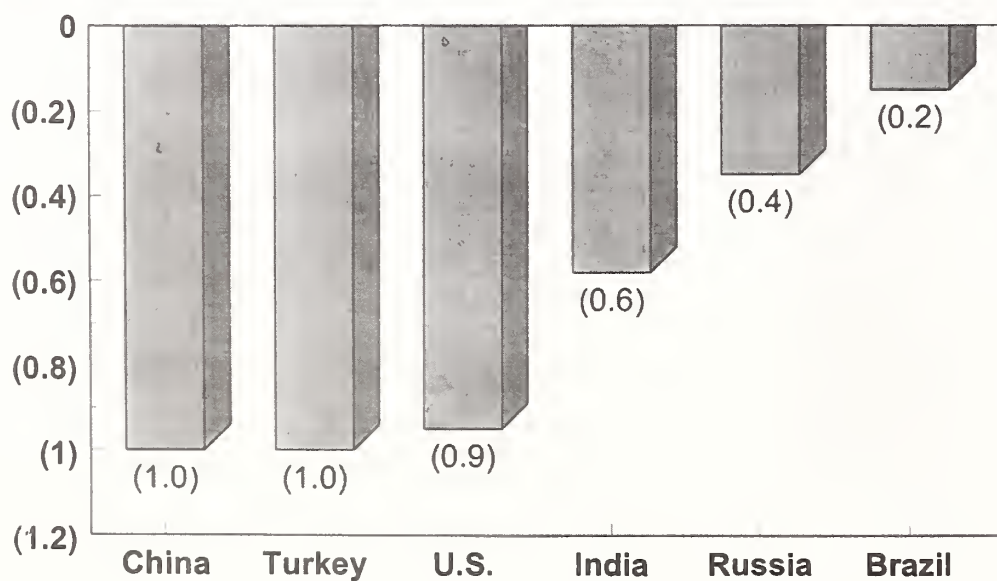
World Cotton Production Losses and Gains for 1998/99

Million bales



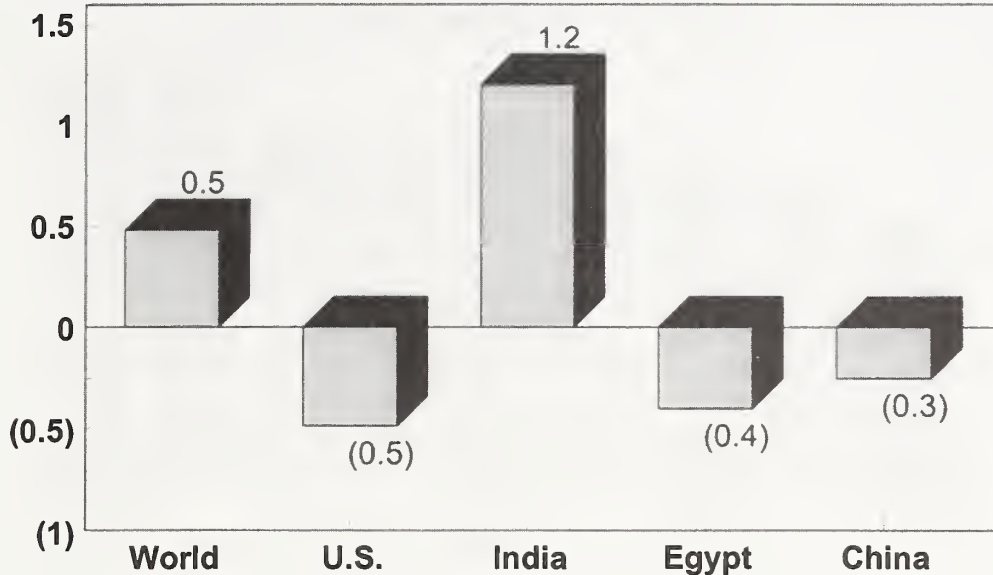
World Cotton Consumption Losses for 1998/99

Million bales



Estimated Stock Changes Around the World for 1998/99

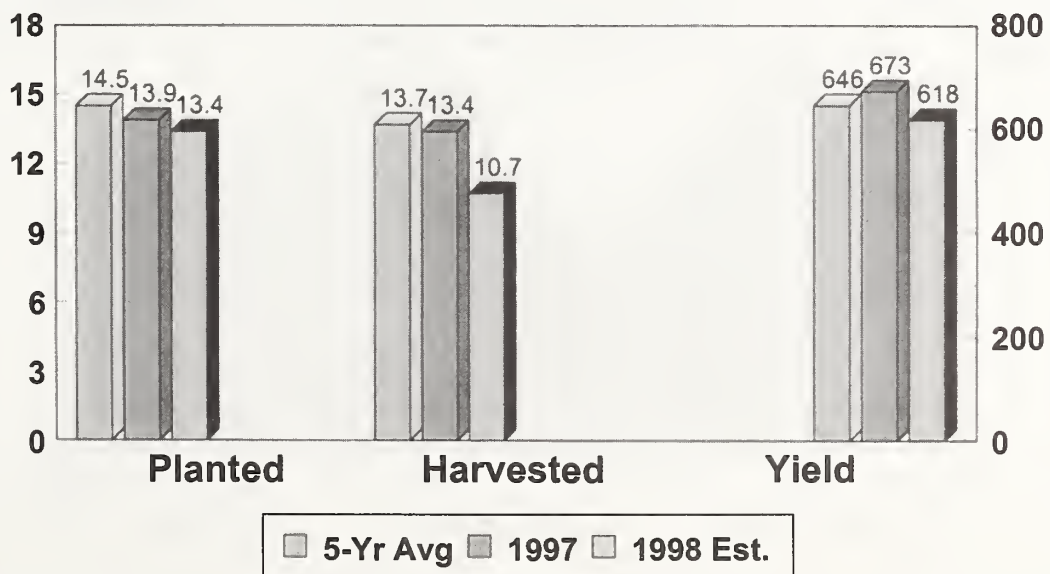
Million bales



U.S. Cotton Planted, Harvested, and Yield

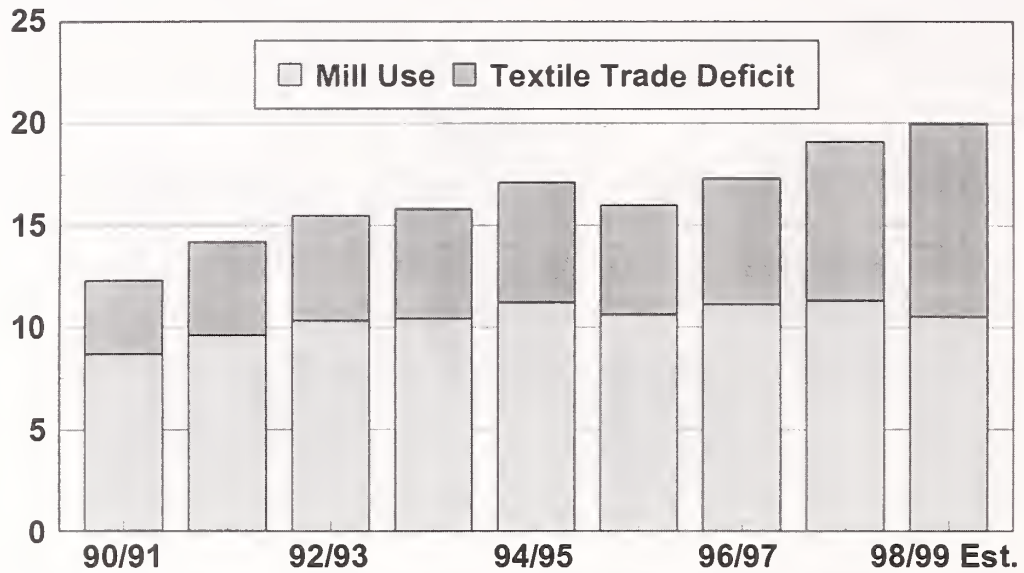
Million acres

Lbs./harv. acre



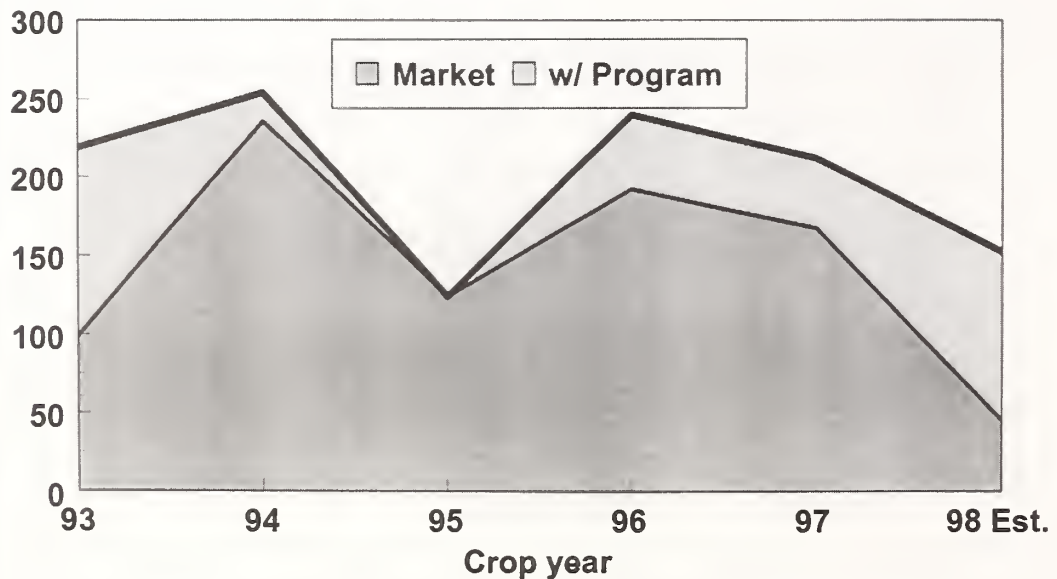
U.S. Cotton Mill Use and Textile Deficit

Million bale equivalents



Net Income Per Acre Outlook for Cotton

\$/acre

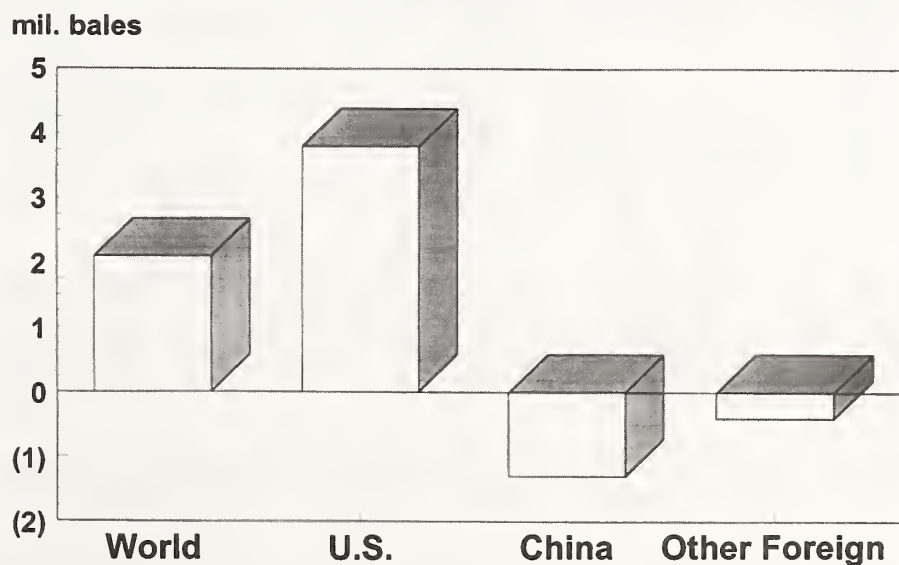


World Cotton Balance Sheet

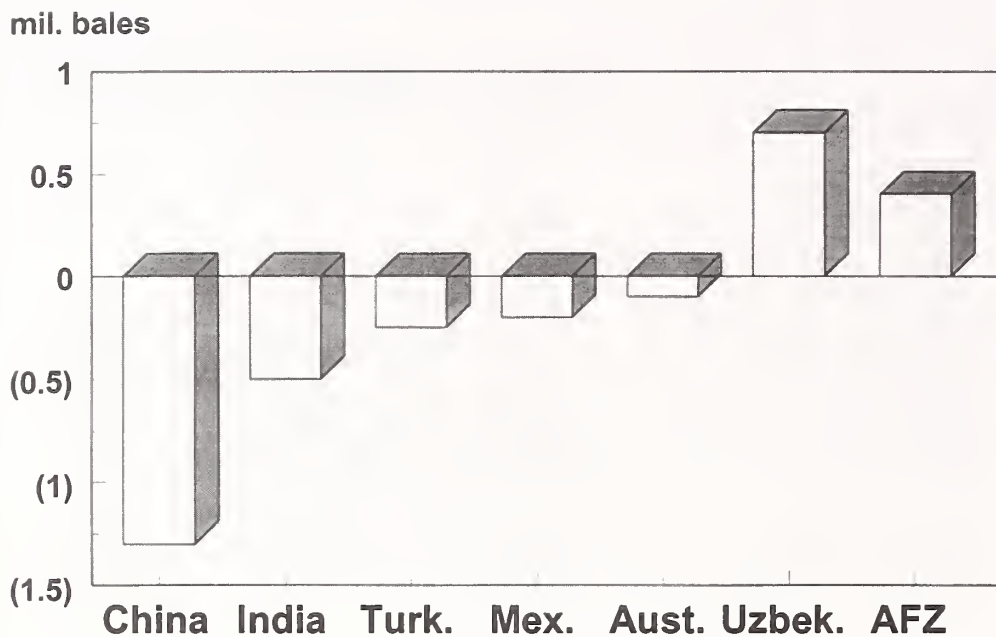
Million Bales

	<u>1998/99</u>	<u>1999/2000</u>	<u>Change (%)</u>
Beg. Stocks	41.1	41.6	
Production	84.9	86 - 88	+1 - 4
Imports	<u>24.5</u>		
Total Supply	150.5	153 - 156	
Consumption	84.6	85 - 87	+1 - 2
Exports	<u>24.0</u>		
Total Use	108.9	110 - 113	
End. Stocks	41.6	40 - 46	-5 to +10 (% Points)
Stks-Cons (%)	49.7	46 - 52	-3 to +3

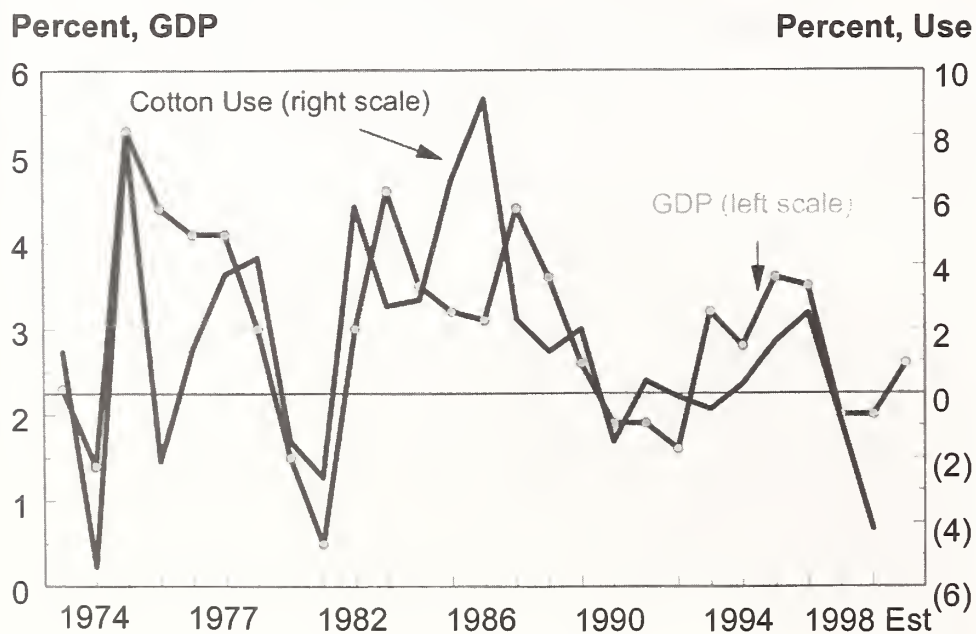
Changes in U.S., China and Other Foreign Production, 1999/2000 Estimates



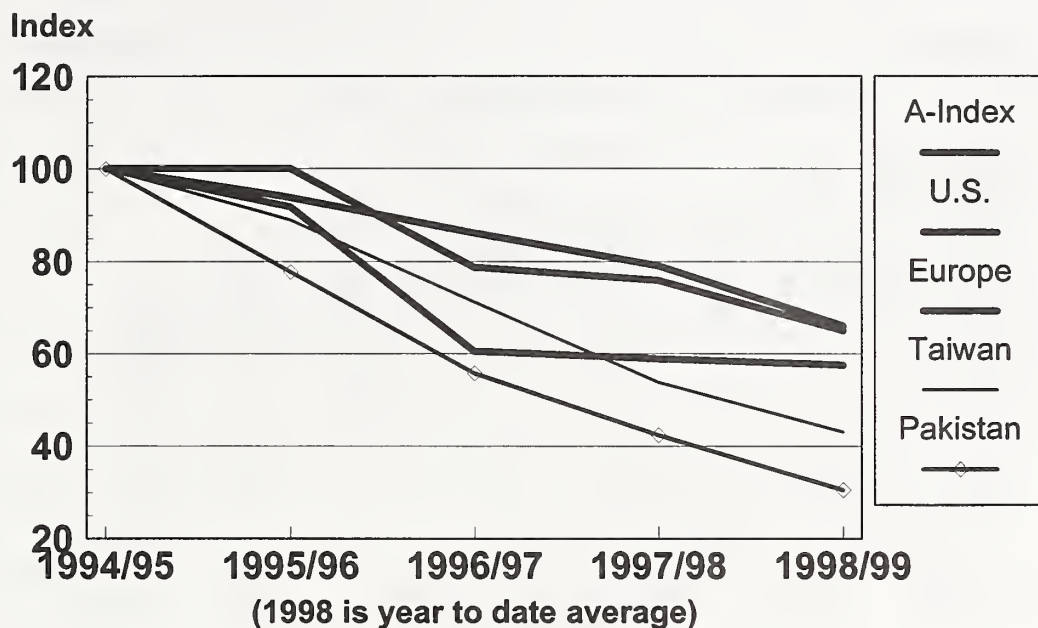
Foreign Production Losses and Gains for 1999/2000



World Cotton Use Grows With GDP



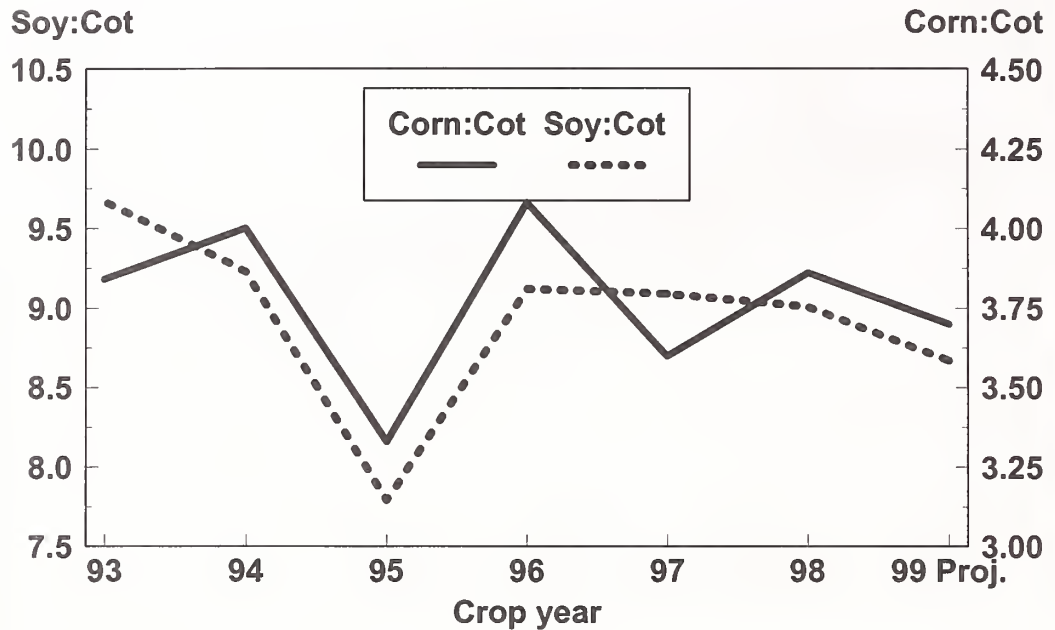
Polyester & Cotton Prices Index of Prices in Dollars



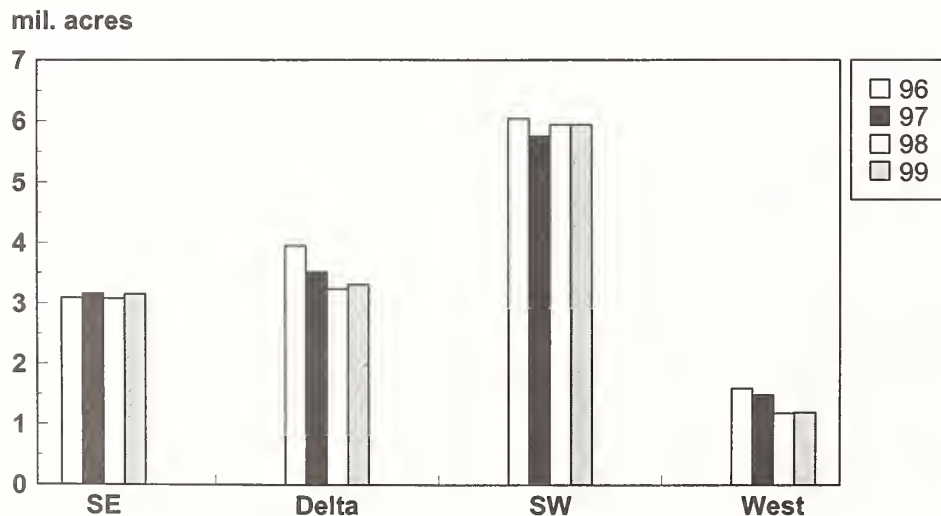
U.S. Cotton Balance Sheet Million Bales and Acres

	<u>1997/98</u>	<u>1998/99</u>	<u>1999/2000</u>
Planted Acres	13.9	13.4	13.5-14
Production	18.8	13.8	17-18
Imports	<u>0.0</u>	<u>0.4</u>	<u>0</u>
Total Supply	22.8	18.0	20.4 - 21.4
Mill Use	11.4	10.4	10-10.5
Exports	<u>7.5</u>	<u>4.2</u>	<u>5-6</u>
Total Use	18.9	14.6	15 - 16.5
End. Stocks	3.9	3.4	4.9 - 5.4
Stks-Use (%)	20.6	23.3	30 - 36

Corn and Soy Price Ratios to Cotton (based on harvest futures at planting time)

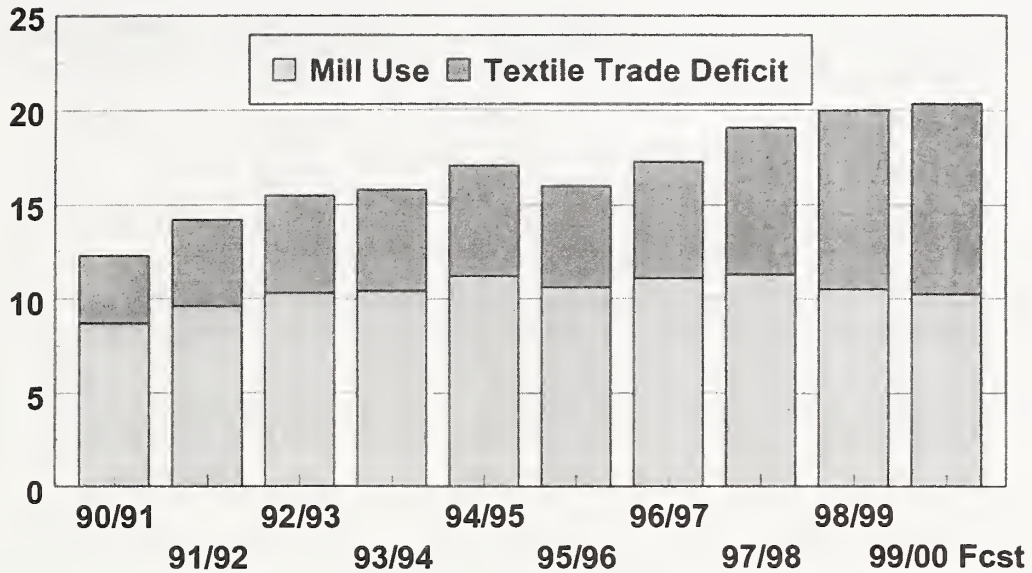


All Cotton Projected Regional Planted Acres



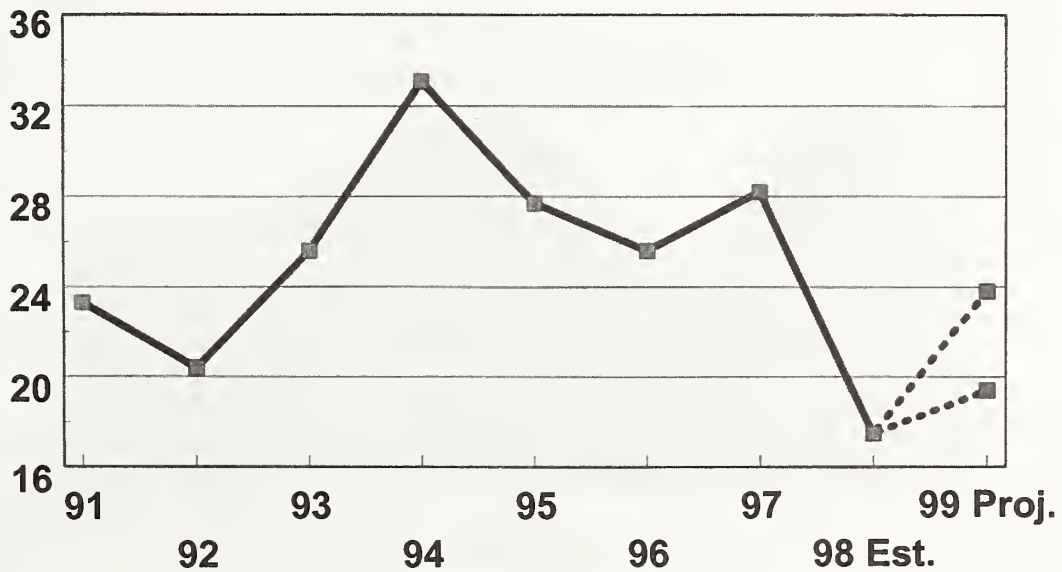
U.S. Cotton Mill Use and Textile Deficit

Million bale equivalents



U.S. Share of World Cotton Trade Outlook for 1999/2000

Percent

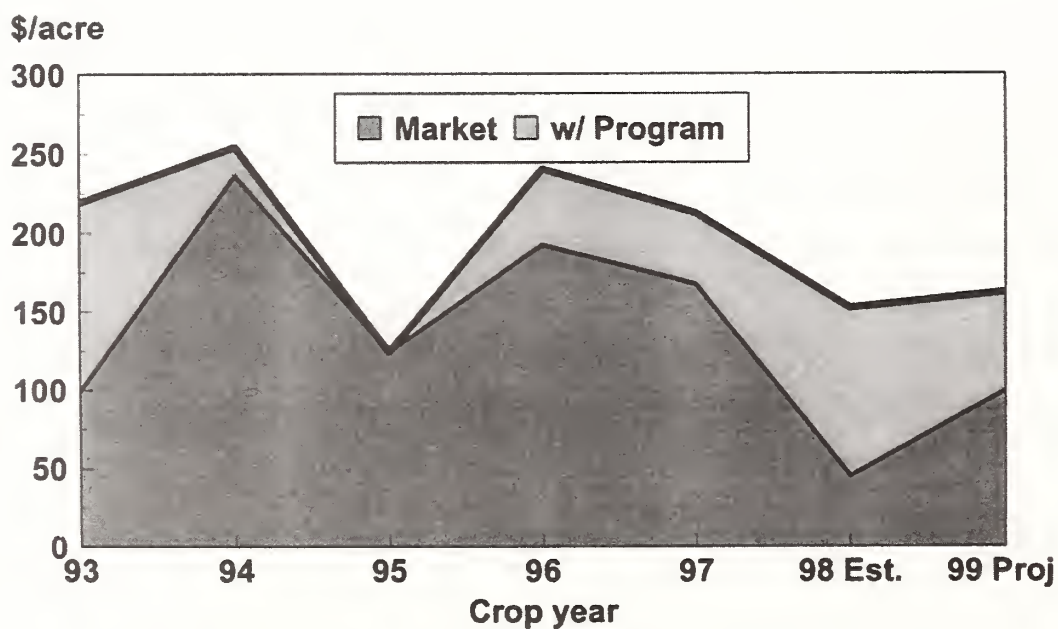


U.S. Cotton Balance Sheet

Million Bales and Acres

	<u>1997/98</u>	<u>1998/99</u>	<u>1999/2000</u>
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Net Income Per Acre Outlook for Cotton



Meeting The Challenges of Producing Cotton in the United States

O.A Cleveland, PhD
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Mississippi State University

A cotton grower suggested to me in 1996 that cotton prices had forever moved to a new plateau. His reasoning was that inflation had driven prices higher and that the typical base range for cotton prices should reasonably be expected to be between 75 and 85 cents per pound. The failure of his analysis was in realizing that cotton is "just another commodity" and like any other commodity it is subject to wide price swings based on global economic conditions as well as global cotton production trends.

Risk management has become the enlightenment word of the final decade of this millennium. That notwithstanding, a grower's long-term success in cotton production will be judged by his ability to successfully manage both production and marketing risks. The past generation of cotton growers largely found success via government programs. Success during the early years of my generation was footed in government programs. However, the globalization of world economies, coupled with the movement of United States agricultural policy toward a single world market, has clearly demonstrated that the US cotton grower of the future will obtain an ever and ever insignificant proportion of his revenue from the government.

The challenges of risk management facing today's cotton grower can be described in terms of: (1) Government Policy, (2) Marketing, (3) Technology, and (4) Weather. These categories are interlocking and highly correlated. The common thread is finance and risk management.

Government Policy

The goals of the 1996 FAIR Act (Federal Agriculture Improvement and Reform Act) were to reduce both the government's regulatory and financial involvement in agriculture. This legislation was the most dramatic change in farm legislation since the 1930's. The first goal was approached by allowing producers the freedom to produce any crop. The second goal was accomplished by moving from the traditional target price concept in favor of "transition payments" and by a commitment to restructure crop insurance. For the first time since 1933 the producer was given total control over his crop mix.. Program payments were decoupled from crop production and a producer's total production was eligible for Commodity Credit Corporation (CCC) loan.

The cautious cotton grower should perceive "transition payments" as the beginning of the end of programs. However, we were able to find 6 billion dollars in emergency funding last year

Appreciation is expressed to Dr. John E. Lee, Dr. Keith H. Coble, and Dr. Stan R. Spurlock for their review and critical comments. The author accepts responsibility for all comments.

and the 1996 farm legislation was worded so that Congress reverts to permanent legislation in 2002. One must remain skeptical that the era of “no program” is near. Nevertheless, this is very difficult for growers. What is the economic decision criteria a grower should use in the consideration of land and equipment purchases? Thus, we see that major intermediate-and long-run decisions depend on knowing the future direction of government policy. That is, on knowing the unknown, as decisions to purchase land and equipment and at what price depends on the future of government programs.

Thus, from an average payment of 14 cents per pound during the 1985 and 1990 farm bills, the 7 cent average under the 1996 legislation should be viewed a precursor to the elimination of payments in the first decade of the 21st century. Additionally, be aware of discussion that payments may be decoupled from land ownership and made only to operators or owner-operators. This necessitates an entirely new structure for landlord-tenant relations.

The FAIR Act removed the safety net of previous farm programs. Since then cotton supplies have been volatile as have prices. However, the essence of the FAIR Act promised growers that the Risk Management Agency (Federal Crop Insurance Corporation) would develop products for cotton. Thus, a major failure of the “intent” of the FAIR Act has been the failure of government to modernize crop insurance with respect to cotton.

Insurance subsidies were raised in 1995 and free catastrophic coverage was instituted. Yet, just like the additional premium subsidy this year, these benefits are of little value to the cotton grower because of the ineffective programs. However, the Risk Management Agency (RMA) has authorized a crop revenue product for the South. Other revenue products are likely to be available in 2000. However, two significant problems exist. First, “good” growers find insurance unaffordable and grossly unfair. This problem will continue until the RMA institutes an effective rate structure. Second, there are not any products that offer a price guarantee above the harvest month futures quote. This implies a very low coverage for a crop year like 1999—the current year. Under the current structure, attempting to insure a price above the market price raises rates dramatically and makes insurability problems worse.

The cotton industry must closely monitor these two problems. There is a major concern that the RMA is looking only at the second problem and not the first. Only when the first problem is solved can crop insurance be viewed as a partner in the cotton grower’s risk management strategy. Currently, it is a non-program for most cotton growers. Yet, it cannot be viewed as a substitute for deficiency payments. The following considerations should be debated: raising the subsidy, establish accurate rates, expand revenue products to all cotton regions, devote resources to risk management, and consider risk management saving accounts.

The lack of an effective insurance program, coupled with the burdensome affect on price resulting from an oversupply of foreign produced cotton, frame the current situation and outlook for cotton.

These events have brought focus on cotton imports and the 3-step competitive provision of cotton legislation. In 1996 the Step 3 program allowed an unmanageable amount of import quotas to accumulate. Step-3 import quotas were allowed to build even when US

manufacturers were not importing cotton. Then, in 1998 the Step-2 program was allowed to run out of money, thus reducing domestic sales, expanding imports and effectively cutting off export sales. Calendar year 1999 begins with a similar outlook. Both of the provisions need reviewing as the program may increase market volatility.

World trade and the uneven playing field for cotton floats under the umbrella of government policy. With cotton so heavily subsidized in most of the exporting countries, too much cotton moves onto the world market at prices below the true economic cost of production. The result is that global market prices are unnaturally depressed making it difficult for US cotton to compete without a competitiveness program like Step-2. In effect, it brings into question the legislative legitimacy of the FAIR Act for cotton. The next round of WTO trade negotiations must give high priority to this de-facto dumping of cotton in the world market.

The right to delineate production preferences has generated significant structural changes on many farms across the four cotton production regions. For example, between 1995 and 1998 corn acreage increased 74 percent in the Midsouth, 23 percent in the West, 22 percent in the Southeast, and 18 percent in the Southwest (Texas and Oklahoma only). The most dramatic change was in Louisiana where corn acreage increased 213 percent in that same period. Even more dramatic changes have been noted on many individual farms. More than a few Midsouth cotton growers have left cotton altogether in favor of grains. Midsouth and Southeast cotton growers have come to appreciate the agronomic benefits of a cotton-corn rotation. Peanut acreage has expanded on some farms in the Southeast, Midsouth and Southwest. Some cotton growers that did not have peanuts in 1995 now have more land seeded to peanuts than cotton.

These acreage shifts, coupled with the resulting changes in infrastructure shifts necessary to adjust to changing cropping patterns and the decreasing importance of government support, are speeding the transition of farming as a "way of life." Growers slow to recognize this pattern are those that are being moved out of production agriculture. These events are speeding the need for growers to control more and more acreage. Nevertheless, after two successful grain crops, cotton growers have learned that grain profits will not cover a cotton debt. Too, profits from grains have not been sufficient to allow for acreage expansion. The successful grower must expand his operation while controlling his debt-to-equity ratio.

Marketing

Cotton growers are presently held in the vice-tight grip of old crop prices well below the cost of production and facing a planting season that suggests another year of the same. Yet, of the just expired 24-month period that the December 1998 cotton futures contract was traded, January 1997 through December 1998, prices were above the 75 cent level in 15 of those months. Too, on six specific occasions of one week or longer, the December futures contract was above the 76 cent level. Nevertheless, I would guess that over the last six weeks, I have fielded 400-500 questions about "what to do with my old crop."

Historically, average annual prices received by growers have covered the cost of production in only 8 of every 10 years. Thus, growers have had to extract enough market (and government) income in eight years to cover ten year debts. Recalling that government payments averaged 14 cents per pound under the 1985 and 1990 farm bills suggests that the growers future in cotton

production will be determined by his ability to manage price risk. During the days of tight regulatory production control growers became accustomed to using the CCC loan as a primary part of their marketing strategy. They simply entered cotton into the loan program and sold the cotton later in the marketing season when seasonalities suggested higher prices. An outgrowth of this is to make delivery of the physical cotton at harvest, but delay fixing the price until later in the season, using either the December, March, May or July contract. Historically, most growers have rolled the price fixation from contract month to contract month expecting prices to move higher.

This marketing strategy, and its outgrowths, can only be classified as the “hold and hope” strategy. This hold and hope strategy, more often than not, was successful during those times. Yet, the FAIR Act, coupled with the 3-Step competitiveness provision, has redefined the world cotton marketplace. Just as the foreign textile mill has always been a significant market for US cotton, foreign cotton now has an easy path into the US. Too, growers forget that the CCC loan period is now only 9 months, not 18 months. Thus, their decision making horizon has been reduced.

This redefinition of the world marketplace has brought into question another of the time honored traditions of the cotton market...delaying the sale until after harvest. Since 1996 the hold and hope strategy has had dubious results. However, an increasing number of growers indicate both their willingness to use and their actual usage of the cotton options and futures markets. The use of put options for the establishment of a price floor is common with an increasing number of growers. Likewise, the use of a call option that allows for a higher price after the fixation is gaining some understanding. Certainly, the number of growers using option spreads is increasing. This indicates an increasing level of market knowledge.

However, extracting a profit from the market has not historically been the goal of most cotton growers. Rather, they have tended to look for specific prices. The survivors will quickly learn that the market is a tough taskmaster, it gives the test first and the lesson afterward. The marketing lessons will be hard learned, as for nearly three generations the government has been there. There is an overwhelming need for grower marketing plans to become pro-active rather than maintaining traditional reactive strategies.

Technology

The elimination of the boll weevil slowly moves west, but it continues to move. Research and extension lie at the heart of an agricultural community. A high dollar, high risk commodity like cotton demands it. Cotton growers have been masters in accepting and implementing new technology. The worn out adage, you must lower your cost of production will always be true. Innovations in GIS, equipment, precision farming, and biotechnology will flow yearly. The innovators will succeed, the non-innovators will fall out of cotton. One challenge is for the grower to learn just how costly the extra 10 pounds of yield may be. Growers have been slow to accept this and it is an increasing problem.

Weather

There is nothing unusual about weather disasters. We have good years, bad years, great years and the like. The El Nino and La Nina phenomena have been well documented. These weather

cycles, predictable or unpredictable as they are, are at the extremes. Nevertheless, there is a weather disaster somewhere every year. The private market, along with government interaction, has responded with crop insurance programs as discussed earlier. While these programs have been important to some in the cotton industry, the majority of cotton acreage is not covered by insurance. The development of a workable program was "promised" in the debate surrounding the FAIR Act. The absence of such a program leaves the majority of cotton growers without a tool with which to manage weather related production risk.

THE NEW DIRECTION OF CHINA'S COTTON POLICY

Shi Jian Wei

Director-General, Bureau of Cotton and Jute
All-China Federation of Supply and Marketing Cooperatives

Ladies and Gentlemen, and friends of the cotton industry:

Thank you for your invitation to Mr. Su and me to attend the 1999 USDA Outlook Conference Cotton Session, giving me an opportunity to speak and meet with my new and old friends, exchange information, and discuss issues.

I am going to (1) give a brief explanation of recent changes of China's cotton supply and marketing situation and policy reforms, (2) introduce China's new 1999 cotton policy, and (3) analyze potential policy impacts on production, marketing, and consumption of China's cotton.

Recent Changes in China's Cotton Supply and Sales

From 1993 to 1995, China's government raised cotton procurement prices significantly to resolve a tight cotton supply. Standard roller gin cotton prices increased from RMB 6,000 per ton (RMB 300 per dan) in 1992 to RMB 6,600 per ton (RMB 330 per dan) in 1993, followed by another increase to RMB 10,880 per ton (RMB 544 per dan) in 1994, and increased again to RMB 14,000 per ton (RMB 700 per dan, Xinjiang RMB 630 per dan) in 1995. Meanwhile, we promoted scientific methods of cotton production that significantly enhanced the farmer's willingness to plant cotton. Therefore, cotton yield and production have increased. In 1997, China's cotton production was 4.6 million tons. This was the third highest production on record, surpassed only by crops in 1984 and 1991. Although severe floods hurt some part of cotton producing provinces of Hubei, Hunan, Jiangxi, Jiangsu, and Anhui in 1998, China's cotton production is expected to be about 4.3 million tons.

While cotton production increased, there were major changes in cotton consumption in China. The market has changed from a shortage to a surplus condition. There are several reasons for this. First, China's raw cotton prices were high. China's domestic cotton procurement price is equivalent to US 76.5 cents per pound. Add in ginning, baling, storage, transportation, interest costs and value added taxes, and China's cotton sale price is about US 96 cents per pound. High prices translated to high costs for domestic mills. Consequently, mills are unwilling to use domestic raw cotton. Second, world cotton prices fell steadily. China's imports of cotton, yarns, and clothes have increased. The sale of domestic raw cotton became difficult. Third, prices of synthetic fibers have decreased, resulting in a gradual decline of cotton use in the mix of textile products. Fourth, since the outbreak of 1997 Asian financial crisis, China's textile exports have decreased greatly. Fifth, China's cotton mills are experiencing structural readjustments and

cotton consumption was lowered because of fewer spindles. All above-mentioned factors have created difficulties for sales of China's cotton. Raw cotton inventories are piling up.

Cotton Policy Changes in China

Cotton has been strictly controlled by China's government for the past several decades. The Government set cotton procurement and sale prices. It authorized the Cotton and Jute Companies (CJCs) to serve as a monopsony to conduct cotton business. No matter how the market supply and demand situation changed, CJCs must buy up the entire cotton production at a preset procurement price. A portion of any unsold cotton could become part of a national security reserve and the remainder kept in CJC for commercial sale in the coming year. As China is moving toward developing a socialist market economy, a centrally planned and managed cotton system is no longer suitable to the new market conditions. In recent years, China's government has implemented a series of policies to help cotton marketing reforms. In 1996, cotton sale prices were allowed to fluctuate plus or minus 4 percent around the standard sale price. Meanwhile, the way of conducting cotton supplies and sales was improved. Buyers and sellers were permitted to conduct business face-to-face through public cotton exchanges and fairs. In 1997, the allowable range of fluctuations of sale prices was enlarged to 6 percent, a rise from 4 percent in 1996. Also, the government decided to convert annual cotton exchange events into a permanent exchange market so that buyers and sellers can trade their cotton all the time. On April 20, 1998, China's government decided to lower the 1998 cotton procurement prices. The price for standard roller gin cotton was decreased from RMB 700 per dan to RMB 650 per dan (Xinjiang RMB 570 per dan) with a 5 percent price fluctuation band. The cotton sale price was also liberalized. In September 1998, government decided to subsidize procured cotton within CJCs. For each ton of procured cotton, government adds a subsidy of RMB 1,140 (RMB 57 per dan), equivalent to US 6.2 cents per pound. The announcement of subsidization policy was caused by the fact that China's cotton procurement price is still higher than the world market price. On the one hand, China's cotton mills cannot afford the high cost, but, on the other hand, China's government does not want to announce a second drop of the cotton procurement price within the same year and risk losing credibility with cotton farmers. Consequently, a financial subsidy targeted to CJC was enacted.

Recently, China has decided to follow a socialist market economy system to implement more cotton marketing reforms in 1999. The goal of these reforms is to gradually establish a new market system for determining the allocation of resources while the government only plays a role of macro-management. The major reform programs are as follows:

First, to establish a new market price formation mechanism under the guidance of government. Beginning September 1, 1999, the beginning of new cotton marketing year, the government will no longer set procurement and sale prices. The Government may intervene in the market by using economic means such as managing CJC's reserves, or through imports and exports to avoid severe fluctuations of cotton prices. Government agencies will announce non-binding guidance procurement price and planting targets based on current market conditions, costs of production, the grain-cotton price ratio, and world market prices. This information will guide cotton production and will balance total supply and demand. State subsidies to the CJCs will be eliminated.

Second, to broaden cotton sales channels. In addition to CJs, plants for processing fine varieties of cotton under the Ministry of Agriculture, State farms, and certified cotton mills of textile industry can directly buy, process and operate cotton businesses. But individual cotton merchants and uncertified mills are prohibited from buying, processing, and operating cotton businesses. The certification process will be carried out jointly by Provincial Industry and Commerce Administration and the [local] Bureau of Technical Supervision.

Third, to promote a publicly recognized cotton quality evaluation system. Starting 1999, all commercial cotton sales have to come with a certified cotton quality grade report. Either sellers or buyers can request professional services to evaluate fiber quality. A quality certificate will become the basis for calculating final cotton prices.

Fourth, establish cotton exchange markets to assist cotton orderly sales. China has to establish a cotton trading and exchange network that uses national cotton markets based on major production and consumption areas. The network has to be computerized to track cotton trades. The government will participate in the cotton trading and exchange network activities such as buying or releasing cotton reserves, in order to be able to influence the market supply and demand and prices.

Fifth, continue the government practice of arranging cotton imports and exports through State authorized business entities. The textile industry will be encouraged to use domestic cotton in making products while strictly enforcing processing and trade regulations. Those who smuggle cotton in the name of processing for exports and illegal sales of cotton and yarns from unauthorized merchants will be penalized.

Sixth, promote premium cotton varieties and adjust the regional strategies for planting and production. The policy will be to slow down the fast expansion of Xinjiang's cotton by keeping sown areas for the year 2000 at the current level. Cotton planted areas in Yangtze River and Yellow River will be further reduced. From now on, China's cotton production and farmers' income would mainly come from improved yield and higher quality.

These reforms indicate that China's cotton production, marketing, and consumption will be moving towards a market economy system.

New Policies and Impacts on Cotton Production, Marketing, and Consumption

It is difficult to predict the potential impacts on cotton production, marketing, and consumption caused by the new cotton policies. There are many factors that influence cotton production and sales including prices, competing crops, the domestic economy, and the world market.

Production

The new policy emphasizes that procurement and sale prices will come from the market, not the government, effective September 1, 1999. On January 11, 1999, the government announced that the guiding reference price for cotton procurement in the marketing year beginning in 1999 would be RMB 10,000 per ton (RMB 500 per dan) for standard roller gin cotton. The reference price

was lower than 1998 crops by RMB 2,350 per ton (equivalent to US 12.8 cents per pound). This announcement is likely to discourage cotton planting, to reduce cotton production, to lower the costs to the textile industry, and to stimulate cotton consumption.

However, I personally believe that China's cotton area will not decrease significantly. Total planting area may be kept at 4 million hectares (60 million mu). Assuming normal weather, production will be around 3.7 to 4 million tons. One of the reasons for this conclusion is that grain crops had a bumper year in 1998 and grain prices dropped. Although cotton procurement prices were lowered as well, there are many areas where farmer could get a better return from cotton than grains. In particular, there are more open channels for selling cotton [than grains] in rural areas, therefore, farmers are more willing to plant cotton. Another reason is that cotton farmers have been specialized for generations. It is not easy for them to divert their fields into other crops. Also, most northern cotton and wheat double cropping areas such as Henan, Shandong, Anhui, already have made cropping arrangements for cotton when winter wheat was planted in the Fall of 1998. They can only continue to plant cotton. If cotton producers cannot sell their cotton at a price higher than RMB 10,000 per ton, they would feel the loss of their income. Consequently, planted areas and cotton production will be lowered further in the year 2000. In other words, the new cotton policy's impact on China's cotton production will be more fully realized in the year 2000.

Consumption

There are two major factors that influence China's cotton consumption. First, there is a relative position of China's domestic price to world cotton market prices. If China's cotton price is higher than the world price, there must be a group of mills that will buy cotton from the world market and thus reduce consumption of Chinese cotton. Second, because of the Asian financial crisis, the outlook for China's exports of textile products is weakening. This also affects domestic mill use. Combining these two factors, plus a consideration that China's economy is facing a structural adjustment, there is unlikely to be a big increase of cotton demand in China. For the next several years, based on my personal view, China's annual domestic cotton consumption will stay around 3.25 million tons. If the world cotton price is lower than US 70 cents per pound, China's domestic sale price of raw cotton to its local mills will be higher than the world market price. We hope for a quick turn-around of the world economy China can sell more textile products. Meanwhile, if the world market price becomes acceptable, we can sell some of our cotton.

Thank you.

(Translated by Hsin-Hui Hsu, USDA/ERS)

NEW MARKETING DEVELOPMENTS FOR FRUITS & VEGETABLES ADAPTING TO MARKET CHANGES

A.G. Kawamura

Board Member, Western Growers Association - Newport Beach, Ca.

It is exciting to have this opportunity to participate in the 1999 USDA Outlook Conference and to share some thoughts about the very competitive fruit and vegetable business. As a third generation grower and shipper of fresh produce in Orange County, California I feel that our urban experience will offer some interesting contrasts and insights to producers in other parts of the country. I am pleased to appear at this conference as both a farmer and marketer, and I make that distinction because of the significant differences and conflicts between the two occupations.

My brother and I run a medium sized produce operation where we grow 300 acres of celery, 500 acres of green snap beans, 75 acres of strawberries and 200 acres of other vegetables from radicchio to zucchini. We lease all of our farm lands, own our shipping and cooling facility, and, also handle and market over 600 acres of produce from other growers. We provide short term financing to most of our growers. Our customer base is local, national and international. We have participated in farmers markets and local roadside stands, and have been sending celery to Hong Kong and strawberries to England for over 30 years. Most of our produce is sold directly to major chain stores and shipped directly from our facility to points throughout North America. We have a very small amount of acreage that is certified organic, but the majority of our acreage would be considered sustainable. In short, we are an urban grower-shipper that has been trying to adapt to the challenges of an increasingly competitive fruit and vegetable economy.

In setting the stage for this discussion it makes sense to take a quick look back some 20 to 30 years at the produce industry. It wasn't too long ago that many of us let our production drive our marketing. We grew it and hoped to sell it. The terminal markets were still the hub of the distribution system, food service was still developing and there were many, many chain stores throughout the country. Over production usually found its way to the consumer in the form of blow out prices, as the demand and supply dynamics seemed to respond predictably. There seemed to be a more efficient safety net out there for over production. You could call a buyer and ask him to go on add this very same week because of unexpected blips in production cycles. You knew that every day you would talk to the same person in terminal markets from Boston, Philly, Detroit, Chicago and that the chain store buyers would be friends for a lifetime. These kinds of relationships defined the produce industry for generations. There was a piece of the proverbial pie for everyone...so what happened? Where are we today?

It would be too simple to say that consolidation in the retail and food service industries, global trade and treaties, higher production costs have driven a competitive stake into the heart of the American producer. There are so many different factors in every region and for every commodity grown. Someone's lemons will always be someone else's lemonade. To depend on another's

misfortune for profits is a sad commentary about how this industry operates. You have to wonder about the sanity of a system that celebrates a freeze in one area or an El Nino in another. Of course, the sanity of our global food supply system is not the discussion for today! What *is* clear today and at least for tomorrow is that we are competing with each other's as producers not for the chance to feed each other, but for the chance to earn a living and a profit. The risk that growers and marketers take today is enormous in the way of vulnerability to weather, market supply, the whims of the media and the government. Producers can try to be proactive but invariably must respond and adapt to the changing market place after the fact.

As we head into the new millennium we have so many choices for our production and for our products. So many more than we had 30 years ago. Will it be grown organic, conventional, sustainable, certifiable, local, foreign, hydroponic, hot house, green house, shade house; will it be irradiated, fumigated, processed, packaged, bulk, value added, designer, heirloom; how will it be merchandised, slotted, promoted with MPP funding, found on a website? Can we please re-invent celery the way the cocktail, baby carrot has re-ignited the carrot industry? How do we expand shelf space, increase consumer buyer appreciation? How do we put DOMESTIC FOOD SECURITY at the top of the list of priorities that a hungry nation might want to review? (Of course, that's not the discussion for today!)

Today's discussion was to touch on new marketing developments in the fruit and vegetable economy and how to adapt to those market changes. There is little I can say that hasn't already been described in depth in the myriad of agricultural publications and journals that so adequately cover our industry. Every new edition has interviews and introspections on where the industry is and where it's headed. I think most of us depend on these kinds of communications to keep our fingers on the pulse of the industry. Trade shows and conventions enhance our ability to keep abreast of market trends. Sometimes I feel like a dinosaur as I read article after article describing pioneering businesses flourishing in this competitive environment. Evolution is the process of adaptation and today I feel qualified to speak about the survival of the urban farmer and our experience with urbanization and how it impacts positively and negatively on our ability to compete.

I farm in Orange County, California. It is one of the few counties in the country named after an agricultural commodity. Unfortunately, Orange County can no longer grow oranges competitively. In fact, last year for the first time lemons were a higher value crop than oranges. (This seemed to fit the bankruptcy the county was going through at the time.) As I mentioned before, all of the ground on which we farm is leased. Most of it used to be orange groves. It is ground that is currently worth from \$200,000 to \$1,000,000 per acre. We pay \$1000 to \$1500 per acre/year on a lease that is interruptible, that is, the landowner can ask us to vacate the premises at the completion of any crop. Most leases are on a year to year basis, as agriculture tends to be an interim use before development. Southern California is mostly dependent on imported water and we pay \$400 per acre/foot. The southern part of our county pays up to \$800 per acre/ft. In addition, California has continually exceeded Federal levels for wages, regulations and other business related policies and taxes. I can say without hesitation that we have in Orange County some of the highest combined costs of production in the nation. That is why oranges, sugar beets, iceberg lettuce, asparagus and countless other products aren't commercially grown here anymore, even though we can produce some of the finest quality products anywhere. There

are too many other growing regions that compete geographically and seasonally with these products. The only way to offset these inherently high costs and competitive barriers is to increase yields and improve marketing...or to move.

Many growers have left Orange County over the years and some have quit. But for those of us who are left, we have all modified our crop selection, changed our cultural practices to increase yields and targeted our markets to maximize our real and perceived advantages. Several area growers have reduced their acreage and concentrated on road side stands and stores, and have pursued Certified Farmers Markets as well. They have carefully targeted their production to fit a customer profile in different parts of the county. Specialty crops, ethnic favorites, heirloom varieties, vine ripe advertising has created a steady and faithful clientele. Organic production, where a long term lease or ownership of the land is possible, has given a few growers yet another marketing niche. All of these producers have aided their own destiny by becoming grower-retailers. It has proven to be one of the only ways to pass some of the higher costs on to the consumer.

Our company has chosen to pursue other strategies as well. We have prided ourselves on our ability to make a same day delivery with our produce. We have the ability to load a wide-body LD-3 airfreight container straight from the field in the morning and make it to LAX by the 10am cut-off for a flight to Chicago so the strawberries will be for sale that night on the market or in the chain store. We regularly deliver our green beans the same day to the local chain distribution centers. We have realized that freshness is our best advantage and that same day delivery is worth a lot to a buyer both in terms of shelf life and customer satisfaction. The choice of specific varieties that meet these customer and buyer expectations is critical. We also concentrate our acreage to meet early and late market windows in order to take advantage of our mild coastal climate. The planting and harvest schedules are carefully planned for continuous supply and presence in the market place. Our most recent effort is to create a 'stand in the store' with one of our upscale local chains. We specifically chose to grow an especially delicious strawberry variety and can deliver it by noon directly into the stores and let them merchandise the 'farm fresh' concept to amazed customers. It is no hype to bite into a vine ripe strawberry or tomato, a fresh cut broccoli or sweet white corn. The taste, nutritional value and partnership with the local agricultural community are all positive values that can be promoted. This is a different kind of value added merchandising.

The challenge for urban producers is to create a customer based preference for local grown crops. That preference will positively influence the retailer to pursue and solicit local producers to work in a partnership instead of the 'replaceable supplier' relationship. Agriculture has to be viewed as an asset to the buyer and a resource to a community, not an over priced nuisance that creates dust, tractor noise and mud on roads. Farm tours, pumpkin patches, educational farms, gleaning projects and community gardens are just a few of the interactive ventures that can help build community respect and understanding. The greatest danger to agriculture today comes from a lack of understanding by the public it feeds. In the urban areas of the country the ignorance of city dwellers and policy makers has accelerated the decline of American agriculture. A well meaning urban politician will look at a successful inner city community garden as a replacement for large scale agriculture. This works fine until that garden project gets hailed on, an early frost or someone forget to turn off a hose. Agriculture is too vital to be broken down into preferred

aggregates. The act of growing food and fiber is more than just an economic activity. Somehow we must make the connection between diet, nutrition, health and agriculture. Domestic food security is at the heart of a new strategy for the domestic fruit and vegetable economy. Learning to compete in the 21st century will take a willingness to look for new partnerships and paradigms. This doesn't mean that we don't need imported fruits and vegetables. This does not mean that big agriculture cannot produce side by side with small community producers. The people that would try to divide up agriculture against itself have other agendas driving them. U.S. Agriculture needs to redefine itself before it is defined and confined by non-agriculturists who don't think about how and where their food is produced and expect that their next meal is, and will always be found at the corner grocery store or fast food chain. The complexity of the global food system is really not so hard to understand. The creation of nutritional abundance in this world is the highest, most achievable goal we can work towards. The challenge is for agriculture to create its own destiny at all levels. But that is not the discussion for today...or is it?

**PROMOTING CONSERVATION INNOVATION
IN AGRICULTURE THROUGH CROP INSURANCE**

Jim Cubie
Director
Agricultural Conservation Innovation Center

There are many conservation practices that could have significant public benefits. Many of these are not widely used by farmers. Why? One reason is "risk." When a farmer adopts an unfamiliar technology, it raises the risk crop distress. The unfamiliar technology may fail under the conditions found on *his* farm, or weather events may interfere with the new practice.

The Public Problem

In spite of great strides made by the agricultural sector in applying conservation practices, the level of agricultural inputs leaving farmland is still perceived as too high by the public. At the same time, these inputs (soils, fertilizer, and pesticides) are necessary for modern agriculture to operate economically. Recent data shows that farmers also seem to be applying more inputs than seem to be needed for insurance purposes. New nutrient management systems (split nitrogen tests, legume crediting) and various integrated pest management systems that have been recommended by agricultural experts can significantly reduce a farmer's costs. (Input costs are one of the few costs a farmer can control.)

Thus, many of these new nutrient management and IPM systems appear to offer a win-win situation. When the farmer uses them, he cuts costs and the public benefits through less agricultural related pollution.

Unfortunately, the level of use of many new systems is very low. Why is this? It appears that "risk" is a major issue for farmers. Despite efforts to develop management systems to reduce nutrient application, overall fertilizer use in the Corn Belt has not changed in the last decade.

The Farmer's Problem

Farmers have very low rates of return (about 3% on average.) They have good reason to be risk averse. Fertilizers and pesticides are both used by farmers to manage risks or for "insurance purposes." A successful crop may require a certain amount of fertilizer to achieve a certain yield, assuming normal rainfall. Farmers may apply more than the necessary amount for a normal year because it may rain far more than expected. They may also apply more pesticides than are necessary to control a pest in a normal year because they are afraid that abnormal weather might make their pest problems worse.

Conservation Innovation Risk Management Support

Because of the need to help farmers adopt conservation practices, the development of risk management products for conservation purposes has been supported by a broad variety of organizations. These include:

- American Farm Bureau Federation
- National Association of Wheat Growers
- United Fresh Fruit and Vegetable Association
- VP Gore's Clean Water Plan
- National Audubon Society

BMP/IPM Types of Risk

In fact, farmers face three kinds of risk when considering adoption of any new practice, including IPM or nutrient management practices:

1. Innovation Risk
2. Test-Trust Risk, and
3. Operating Risk.

Innovation Risk:

One barrier to wider use of IPM systems is that the early adopters of the new practice are using a system that has not been tested in a wide variety of commercial farming conditions and therefore is not trusted. For example, a successful Rio Grande Valley, grower told this story illustrating the risk that innovators often face:

Professor Smith from the University told me that I was wasting money, spraying fungicides too often. I trusted Professor Smith because he developed a vegetable variety that has been very profitable for me. Professor Smith told me, 'Just put this moisture meter in the soil weekly. So long as the moisture level is below X, you do not need to spray.' I took his advice. For a few weeks, I used my moisture meter, and the reading said, 'No need to spray.' So I did not spray. Each week I watched as my neighbor sprayed. To make a long story short, by the fifth week, I was so nervous that I sprayed, even though I did not need to.

Test-Trust Risk

It is hard for a farmer to "bet the farm" on a test or procedure, no matter how well established or proven that test may be. The acceptance of corn rootworm scouting procedures and legume and manure crediting illustrate the problem.

Corn Rootworm

After years of research, Midwest entomologists have concluded that less than 50% of the soil-applied insecticides used for rootworm are really needed. Currently, the technology exists to scout cornfields (corn after corn), to determine if a corn rootworm insecticide will be needed next year.

Scouting for corn rootworm beetles is done in July and/or August. At that time, a crop consultant can determine the level of beetle infestation and will make a recommendation on whether to “treat” or “not treat” the following spring for corn rootworm. When using proper IPM techniques, most Midwest entomologists believe that if a recommendation to “not treat” is made, there is less than a 5% probability that rootworm damage will occur next year.

IGF’s agricultural insurance division will be offering a policy to guarantee a crop advisor’s recommendation not to spray for corn rootworm. Under this insurance policy, the farmer will be indemnified if the consultant made a “do not treat” recommendation and an infestation occurred and damage occurred.

Operating Risk

Farmers often apply fertilizer in order to avoid losing N in years of extreme, heavy rains. As a result, most years, when the excess rains do not occur, the excess N does not get used and may affect nearby water resources. There is a need to encourage conservation nutrient management systems. If a farmer were to adopt a split N application system, for example, he would run the risk of not being able to get into his field and apply the second portion of his nitrogen. In fact, according to press reports, the Illinois Extension Service warns farmers against adopting the split application nitrogen management system because of the risk that excessive rainfall will interfere with a second application of fertilizer. ACIC has developed a rainfall based risk management policy to address this risk. The farmer will be indemnified if, indeed, excessive rainfall occurs and prevents the farmer access to fertilize his field.

Research on Risk as a Conservation Adoption Barrier

Numerous studies have found that risk is a major reason that farmers are not adopting technologies, such as nutrient management and IPM, that even the farmers believe are profitable.

A 1995 USDA Economic Research Service Study, entitled “Voluntary Incentives for Reducing Agricultural Nonpoint Source Water Pollution” surveyed a number of farmers to determine why they are not adopting these win-win practices. This study found that although farmers understand the practices, and think they cut costs, they still do not adopt them. In probing further the study found that, with regard to both IPM and nutrient management, “risk” was one

of the two principal reasons that the practices are not being used. The study further found that farmers perceive the risk of some conservation IPM or BMP practices to be as high as 70-80%.

A second recent National Academy Report entitled Ecologically Based Pest Management, reached similar conclusions. It found:

The interaction of economic feasibility and risk largely determines the likelihood that an ecologically based pest management system will be adopted or implemented by growers.

Commercial Risk Management Products for Coming Crop Year

Two major insurance companies will offer pro-conservation policies created by ACIC, a non-profit partner with NRCS and EPA.

Innovation Risk

Promoting Agricultural Conservation Innovation Policy

Local organizations, such as Mississippi Conservation Districts and Campbell's Soup have insured farmers to increase adoption of BMP and IPM practices. The need for adoption of innovative conservation systems is large, and providing insurance for even a small number of farmers can tie up a large amount of local conservation funds or cost a local entity dearly if a particular experiment fails. So that local organizations do not have to develop insurance policies for innovators, ACIC has proposed the development of a "Conservation Innovation Risk Policy." Under the policy, a sponsoring conservation organization can obtain for a farmer an "Innovation Insurance Contract." The insurance contract will provide protection for "split field" demonstrations. The farmer will be guaranteed that the field using the innovative practice will not have a significantly lower yield than a comparable field using standard practices. IGF has agreed to offer these policies next crop year. Startup funds have been secured from a private foundation.

Test Trust Risk

Corn Rootworm IPM Policy

IGF Insurance, Inc. will be offering a corn rootworm policy that will insure farmers against the infestation of corn rootworm. This policy will permit a farmer to rely on the advice of an expert who will utilize approved scientific procedures to the soil and then advise him to spray or not to spray. The farmer then can trust the test and follow the scouting advice. If the infestation occurs and the corn rootworm is present after the consultant's advice not to treat, the farmer will be indemnified. The indemnity may pay for a rescue spray. It will also be adjusted using a yield loss predicting test, similar to the way hail policies are adjusted.

Operational Risk

Cold Soils No-Till Policy

American Agrisurance has developed a policy that will protect farmers against a “cold soils” period, which is slowing and in some cases reversing “no-till” adoption in the Corn Belt. It has been developed in cooperation with major ag-chemical suppliers and National Tilth Lab and the Conservation Technologies Information Center out of Purdue University. In the spring, farmers who wish to operate no-till systems run the risk of cold soil, which stunts the growth of their crop. The proposed insurance policy would indemnify farmers if the soil was too cold and prohibit planting during the early spring planting period. How the policy will be offered is now under consideration.

Nutrient and Atrazine Risk Management Policy

American Agrisurance, Inc. will be offering a rainfall-based policy, which will address the risk of split nitrogen application. The “rainfall policy” is designed to compensate for times when a split application is not possible due to excess rain after planting. For some farmers using split fertilization practices, the policy would pay for itself in nitrogen savings alone. The product should also increase adoption of post-emergent weed products which will displace Atrazine use. Several post-emergent weed control products only achieve maximum control when applied in a very narrow window of time.

Other Commercial Products under Development

In addition to the three products that will be commercially available next year, at least one other clean water promotion policy is at final stages of development. Several others are in early stages of development.

Potato Late Blight Policy

This policy permits farmers to follow “wait until fungus conditions exist” announcement made in Wisconsin and North Dakota potato production. By spraying after this recommendation is made, the farmer has could possibly avoid 1-3 fungicide sprays per season.

Other IPM Products under Development

In addition to the IPM related products that will be offered next year, six more IPM products are expected to be commercially available the following year.

National Nitrogen Deficit Insurance Policy

Agriculture’s toughest challenge is the effect of nutrient (N and pH) on water quality. A joint public-private effort should be launched to develop the actuarial basis and adjustment systems to make such a contract possible. Without it, significant reductions in nutrient use

are very unlikely for economic reasons. ACIC has developed a strategy document that outlines what needs to be done to develop a nitrogen management policy. Please see our website for a copy of this material.

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By the American Agricultural Economics Association**

**Much of this will be presented at the Agricultural Outlook Forum 1999 on Tuesday,
February 23, 1999 by Jerry R. Skees.**

EXECUTIVE SUMMARY AND KEY WORDS

Creating a Market for Carbon Emissions: Opportunities for U.S. Farmers

Richard L. Sandor and Jerry R. Skees

This article examines the role that U.S. farmers could play in reducing greenhouse gases – a major international objective. Using the market to trade sulfur emissions has been a large success in the U.S. Likewise, a worldwide market for carbon emissions could help reduce greenhouse gases in a more cost-effective fashion than command and control systems. U.S. farmers could be big winners from such a market as they are uniquely positioned to sequester more carbon by adopting more Best Management Practices (BMPs). Adopting more BMPs has the dual effect of cleaning the global and the local environments.

Keywords:

Carbon Trading, Kyoto, Green Support Payments

Creating a Market for Carbon Emissions: Opportunities for U.S. Farmers

Richard L. Sandor and Jerry R. Skees

Reducing greenhouse gases has become a major international objective. While the international community debates the Kyoto protocol, a number of countries have already announced that they will reduce greenhouse gases. The November 1998 Buenos Aires meeting on the Kyoto Protocol helped advance the trading approach as one means for reducing greenhouse gases. Since carbon dioxide is a major greenhouse gas, creating a market for carbon emissions is under consideration. Should such a market evolve, U.S. farmers could be big winners.

Even though some in the scientific community do **not** believe carbon emissions contribute to global warming, everyone agrees carbon emissions are increasing rapidly. Since it is possible that carbon emissions increase the likelihood of significant climate change, a market should be at the top of the list of policy options to cost-effectively manage emissions. In effect, a carbon trading system may be cheap insurance against potentially large societal problems.

Sulfur Emissions Trading Paves the Way

Emission allowance trading is a straightforward concept that is already operational on a national scale. The U.S. sulfur dioxide emissions market provides a good example. Congress placed an overall restriction on power plant emissions nationwide, effectively allowing power plants to comply by either 1) investing in cleaner fuels or pollution control technologies or 2) buying extra emissions rights from another power plant that made extraordinary emission cuts. Buying excess rights from a more efficient power plant allows the older and less efficient plant to meet its obligations at lower cost to consumers. In short, trading emissions permits allows industry to meet emissions goals in a least cost way.

Title IV of the 1990 Clean Air Act Amendments cleared the way for trading sulfur emissions among 110 power plants. During the debate on this legislation, experts estimated that these emission rights would command a very high premium. Some initial estimates ran as high as \$1500 per ton. Hahn and May report several pre-1992 estimates of forecasted per ton prices for sulfur emission allowances, ranging from \$309 (Resource Data International) to \$981 (United Mine Workers). In 1998, the Chicago Board of Trade (CBOT) auctioned off a large number of allowances at an average price of \$115. Carlson et. al. argue that many factors, in addition to trading of emissions rights, created low prices of sulfur emission allowances: improved technologies for burning low sulfur coal, improvements in electrical generating efficiency, and lower fuel costs.

Evaluations of the sulfur emissions trading program suggest that it has been a success. By 1998 actual sulfur emissions averaged 30 percent below the allowable level. There has also been steady growth in the inter-utility trading of allowances from 700,000 tons in 1995 to 2.8 million in 1997. The full effects of the trading have not been realized as the market is still adjusting to this new innovation. Carlson et. al. estimate that this innovation will save \$784 million annually beginning in the year 2000. Further, they estimate the net cost of the cap and trade system is 43 percent of the estimated costs under a command and control system.

The Potential of Carbon Trades for U.S. Agriculture

If a market evolves for greenhouse gas emissions, those who are now contributing to carbon emissions may be willing to pay others to sequester carbon (remove it from the atmosphere) as a permanent offset to emissions, or as a means of buying time to invest in technologies needed to reduce emissions. When sequestering carbon costs less than reducing carbon emissions, the carbon market would provide a more efficient solution. Firms would likely use a combination of reductions in emissions and offsets with carbon trades.

A market would also motivate technological improvements to both sequester carbon and reduce emissions. For example, if prices signal farmers to sequester additional carbon, the market would respond with new technologies. Price incentives would encourage bio-engineering plants that more efficiently and effectively sequester carbon. Most soil organic carbon is in the upper meter of soil. Could plants with deeper roots sequester more carbon to deeper levels?

The agricultural sector provides a number of effective alternatives for sequestering carbon. Forests and cropland offer the most promise. A large number of solutions will be needed to offset the increase in carbon emissions, and a market offers the best way to orchestrate them. Agronomists (Lal et. al) estimate the overall potential for carbon sequestration using U.S. cropland at 120-270 million metric tons of carbon per year (MMTC/yr). Around 100 MMTC/yr would come from increased use of Best Management Practices (BMPs). The remainder comes largely from acreage conversion and bio-fuels. Worldwide carbon emissions are growing by about 3,000 MMTC/yr. The U.S. emissions target under the Kyoto protocol is roughly 600 MMTC/yr below the level projected by 2010 under current trends. Thus, U.S. cropland could be used to reduce the projected annual world increase in carbon by about 7 percent, or about 30 percent of the U.S. share under the Kyoto protocol.

Most soils have a capacity for sequestering additional carbon. Tilling the soil, however, releases carbon into the atmosphere. Lal et al. report that Corn Belt soils likely have about 61 percent of the carbon that was present in 1907. Minimum and no-till systems can sequester more carbon. In 1997, about 37 percent of the arable land in the U.S. was under conservation tillage. Lal et. al estimate that using more BMPs (primarily reduced and minimum tillage systems) could sequester 5000 MMTC in cropland soils over the next 50 years. That converts to 100 MMTC/yr via wider use of BMPs, while other options offer the possibility of up to an additional 100 MMTC/yr.

Estimates of the value of carbon emissions allowances range from \$15 per ton (Council of Economic Advisers) to \$348 per ton (Energy Information Administration). Based on early market signals, Environmental Financial Products is using market values between \$20 and \$30 per ton of carbon. Without a market to trade carbon emissions, the lower prices (and the lower mitigation cost to society) will not be possible.

Using the low-end estimates of \$20 to \$30 per ton, paying farmers to sequester 200 MMTC/yr could add \$4 to \$6 billion of gross income to the farm economy – and possibly up to 10 percent of typical net farm income. The market for carbon could be a major supplement to the Conservation Reserve Program and, if managed properly, opportunities in the international carbon

market could soften farm income cycles by taking land out of crop production and putting it into conservation uses when relative prices favor carbon sequestering over food production.

BMP's increase the agronomic productivity of U.S. cropland, reduce soil erosion, and improve water quality and wildlife habitat. Thus, BMP's help both the global and local environments. The local benefits are consistent with the goals of the much discussed 'green support payments' (Lynch and Smith). However, rather than using taxpayer dollars, this green support payment could evolve in a marketplace with more diligent monitoring and enforcement. Paying farmers to sequester carbon will heighten the stakes for verification that farmers make changes in their farming practices or that they are actually sequestering more carbon.

Lal et. al. estimate the long-term nutrient value of an additional ton of soil organic carbon at \$200. A ton of soil organic carbon can be added in 4-5 years. In 4-5 years the value of some of the country's most productive farmland could increase 10 to 15 percent. In summary, a carbon market could increase both income and net worth in the farming community by 10 percent or more.

Leading scientists expect that climate change brought about by increased greenhouse gases may bring more extreme droughts and floods. Thus, American farmers can not only sell a new "crop" in the international environmental service market, but also help solve, at least in a marginal way, long-term weather problems affecting farming.

Implementing a Carbon Emissions Allowance Trading Program

A number of factors must be considered when designing a market for carbon emissions. In contrast to the sulfur market, carbon emission sources are less concentrated. In addition, sulfur could be reduced only by cutting emissions. A carbon market, on the other hand, may work through both outright reductions and sequestration. Considerable care must be taken to assure that incentives do not encourage farmers or others to change the baseline used to reward additional carbon sequestered. For example, in the short run a farmer or forester could release more carbon via changed practices so that they are ready to gain more when trading begins.

Low-cost systems to measure carbon in the soils are becoming more feasible. As the market develops, new technologies should emerge to make this task economically feasible. Lal et. al have provided estimates of the existing soil organic carbon for the lower 48 states, but improved estimates are needed. The existing base of carbon needs to be mapped. Only additional tons of carbon that are added to the baseline should be eligible for the market.

While many will get bogged down worrying about monitoring how much additional carbon is sequestered on an individual field, there are more effective means for monitoring and verification. Consider the opportunity for farmer cooperatives, grain merchandizers, biotech firms, and almost any agribusiness. Any of these firms could become a wholesaler for carbon sequestering. Estimates of the amount of carbon actually in the soil on an individual parcel may be flawed. However, the error likely has typical statistical properties and conventional statistics apply – estimating many individual parcels and aggregating them into one measurement will improve the estimate considerably. The agribusiness firm would be responsible for monitoring the individual farmers, possibly with some advisory role from USDA on adoption of BMPs. Under

this system farmers could be rewarded for adopting BMPs and the agribusiness firm would be rewarded based on estimates of actual carbon sequestered.

Sandor, a student of the history of markets, has been heavily involved in inventing a number of new markets. He postulates a simple seven-stage process for market development:

- (1) a structural economic change that creates a demand for new services;
- (2) the creation of uniform standards for a commodity or security;
- (3) the development of a legal instrument which provides evidence of ownership;
- (4) the development of informal spot markets (for immediate delivery) and forward markets (non-standardized agreements for future delivery) in commodities and securities where "receipts" of ownership are traded;
- (5) the emergence of securities and commodities exchanges;
- (6) the creation of organized futures markets (standardized contracts for future delivery on organized exchanges) and options markets (rights but not guarantees for future delivery) in commodities and securities; and
- (7) the proliferation of over-the-counter markets (p.2).

Based on this experience, Sandor develops recommendations for implementing an international pilot program for carbon emissions trading. An international pilot is in keeping with the Kyoto protocol which, during the first phase, puts the burden on developed economies. With trading, those in developed countries would also have the option of involving developing countries by funding low-cost emission reduction projects and by helping developing countries finance their efforts to prevent destruction of existing forests.

An effective carbon emissions market must have a clearly defined tradable commodity for greenhouse gas emissions - the standard measure to be traded must be agreed. An oversight body is needed, along with emissions baselines and clearly specified allocation and monitoring procedures. Once these standards are in place, existing exchanges and trading systems can be used to facilitate trades. Widely accepted standards will increase the credibility of the trades and help standardize the legal mechanics more quickly. All of these steps will lower the transaction costs in the new market.

With standardization and use of existing exchanges and trading systems, a carbon emissions market is very feasible. If we can trade corn on the Chicago Board of Trade, we can trade carbon. A system of quotes, hedging, and options will evolve. The market for carbon trades is, in fact, already evolving (Sandor). Niagara Mohawk (an electric power company in New York) and Arizona Public Service completed a swap of carbon offsets for sulfur dioxide emission allowances in 1996. Environmental Financial Products purchased rainforest protection carbon offsets from the Republic of Costa Rica in 1997. A subsequent 1.1 million acre program also includes assurance from the Costa Rican government that the area will be placed in a national preserve. In 1998, the Japan-based Sumitomo began converting coal-fired electric power plants in Russia to natural gas to earn carbon offsets.

The road to price discovery is being built. A market for carbon reduction services is now emerging. Carbon markets are being designed in the United Kingdom on the International

Petroleum Exchange and in Australia at the Sydney Futures Exchange. Major companies such as United Technologies, British Petroleum and Royal Dutch Shell have also committed to large and early reductions in their own greenhouse gas emissions. Therefore, regardless of whether the U.S. approves the treaty, firms in other countries may soon be willing to pay American farmers to sequester carbon. U.S. action to limit net carbon emissions would help make the benefits and incentives to U.S. agriculture even greater.

Carbon trading is feasible. The prospects of a market will increase this feasibility as new investments are made in technologies and research needed to monitor and standardize carbon measurement. Active trading of carbon could prove an inexpensive insurance policy against the unknown problems that may emerge because of the rapid increase in global carbon emissions. An effective and efficient market-based solution will become even more important as governments around the world tighten restrictions on carbon emissions.

U.S. farmers are well-positioned to help in sequestering more carbon. While helping to clean up the air, the benefits to the sector could be substantial. Farm income and land values should both increase. Local soil, water, and wildlife should benefit. All the while, carbon trading could also make the sector more resilient to other forces that have persistently created cycles in farm income through a market-based CRP program.

▪ **For more information**

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CROP INSURANCE— PRIVATE CHOICE for PUBLIC CONCERN The Company's Role¹

Good news—Farmers respond to incentives.

Bad news—Farmers respond to incentives.

Introduction

The title of this presentation implies that private choice and public concern are not always the same and that there is a role for insurance companies to make private choices more attuned to public concerns. We have heard from previous speakers in this session how private markets and private insurance innovations can internalize externalities (Skees) and reduce obstacles for adoption of improved practices (Cubie).

Private markets can efficiently allocate the costs of public good (the reduction of atmospheric CO₂) between alternative systems of reduced emission or sequestration. Cubie has explained how win-win situations can be created between agricultural producers and environmental concerns with the substitution of financial risk instruments for potentially adverse, physical inputs like fertilizer, pesticides, herbicides, and tillage (increased soil erosion). Some of these potentially injurious inputs are applied in greater amounts for contingent effects (risk). These environmentally sensitive inputs can be reduced with minor yield impacts on average and a portion of the resultant input cost savings can be used to fund insurance that indemnifies when the adverse contingency occurs. The producer has lower costs and as an extra benefit less load is put on the environment. In this presentation, I would like to explore how the insurance mechanism can be used to change the economic playing field such that public and private goals are on the same side.

The Company's Role

Insurance companies are financial institutions that traditionally administer the payment of claims under contractual terms (i.e., insurance policies) from pools of accumulated financial resources mostly gathered from policyholders. Insurance companies pool risk. Risks are taken only to the extent that there remains some volatility in the expected results of the risk pools. Increasingly, insurance companies are being called upon to take on more systemic risks. They are also evolving into multi-faceted risk management institutions that bundle and package various risk management services, information, and risk transfer services. An insurance company quantifies risks, diagnose causes of losses, indemnify insured losses, collect information, and monitor results. With contractual investigative power, insurance companies are unique partners in the business world.

¹ Steven C. Griffin, Vice President of Strategic Analysis, IGF Insurance Company, Des Moines, IA. Paper presented at the Agricultural Outlook Forum 1999, Arlington, VA, February 22-23, 1999. All comments and opinions provided is solely the author's and do not necessarily represent the opinions or positions of IGF Insurance Company, its management, or stockholders.

A Level Playing Field

To illustrate my point, I would like to use the analogy of a playing field in a field sport like football or soccer, and maybe hockey.² In the era of domed stadiums, perfect grass, and laser-leveled playing fields, the significance of the playing field advantage is sometimes forgotten. On those fields of football, the initial flip of the coin decides who chooses who will take first offense (receiving team) versus first defense (kicking team), a strategic decision. The choice of which goal or endzone to defend is inconsequential. There are those games, when the wind is howling through the goal posts or one end is flooded that the choice makes a difference. Yet one also knows that the sides will be switched before the game is over. However, in the much different game where business survival is the goal, the side taken initially on the playing field can determine the outcome. The deciding team is not guaranteed the opportunity to play long enough to switch sides.

In these economic games, the playing field is also seldom fixed. Changing the playing field during the game can be as much as part of the game as the strategies actually played on the field. Although games can be won in an uphill fight, the victories are less than on a level field. Having the downhill advantage makes the win easier and quicker.

Observers of these games sometimes do not see the relative level of the playing field. It is as if they view it from the Goodyear blimp above---what may appear fairly flat can be highly pitched in a certain direction. The pitch may only be discernible as we watch the play and notice the way the ball rolls or how play is concentrated in a certain portion of the field. We may have thought the game was rigged to go one direction only to find the game going the other way. The answer lies in that the playing field is more than one facet deep.

The Three R's

What makes a field level or pitched depends upon three accumulating layers---the three R's---Rules, Revenues, and Risk. Each of these levels is not uniform across the field and most times favor one endzone or goal over the other. Taken together the pitch of one can be enhanced or reversed by another layer. This is not a game of paper, scissors, and rock. If only one layer is viewed or considered, the advantageous goal may not be obvious.

Rules

Rules or regulatory controls can determine a game. As a matter of public policy, rules are sometimes designed to be uniform and level. Equal protection under the law, civil rights, and anti-trust are examples of field leveling rules. Other rules, like affirmative action, zoning, shipping preference, etc. pitch the field toward public goals. Some rules like prohibitions try to stop play altogether by creating a very steep slope or create out-of-bounds lines. Rules and regulations are relied upon to modify the game's outcome that otherwise might occur. But rules are not all powerful. They generally require voluntary compliance in order to be efficient and effective. Seldom is there enough police power if the other layers are strongly adverse. For example, the production, distribution, and use of illegal drugs continue despite a multitude of laws and rules and considerable police efforts---the revenue and risk layers offset the rule. Rules can be clearly advantageous and still not followed even with full knowledge and education. How else do you explain people who speed in traffic, smoke, overeat, or never exercise. They all know better.

² Of course, in this illustration of using a playing field, there are only two goals, one more advantageous than the other. In reality, there can be multiple goals in multiple dimensions.

Revenues

Economic incentives are powerful. Expected revenues, costs, and returns favor one production technique, product, or consumptive practice over another. Of course, economists would say that the give and take of supply and demand, production and consumption, would eventually reach an equilibrium in which everything is equal and our playing field level. I would say economic adjustments move us in the direction of equilibrium but before we get there something happens and the playing field tilts again. Suffice to say if you do not understand why things are the way they are—you can use that famous still-unidentified Washingtonian's advice of 25 years ago—"follow the money". Consumers reward producers that satisfy their wants and needs with exchanges of money. Producers reward their input suppliers and factors of production (labor, capital, land, and natural resources) similarly. Consumers sell their owned factors of production in order to buy what they want or need. Economic revenues are tilted toward products and services desired by the consumer directly or indirectly.

As a matter of public policy, we have pitched the revenue layer with all sorts of slanted revenues. Differential taxation and subsidies attempt to tilt the revenue layer one way or another. These are effective but can be very costly.

Risk

The final determining layer is probably the one most overlooked. If the rules are supportive and the economics advantageous for the goal---why isn't team playing on that end of the field? As we have heard today, the answer is risk. Risk is the third layer. Aversion to risk and the inability to take certain risks can negate the other two layers. Insurance and other risk management strategies do allow the risk layer to be trimmed at the expense of some of the revenue layer. Risk can also be transferred to the public and the layer flattened. Examples of these strategies are the federal crop insurance program, the federal flood insurance program, loan guarantees through FSA, import-export bank, and others.

Private Choice versus Public Choice

In most cases, the public choice wins when the (private) team with the field advantage wins, because the public built the arena in the first place. The winning team is producing a product or service that the public wants. The desires of the consumer pitch the field in favor of that goal with revenue. Rules are generally neutral and the risks are normal and acceptable (level) with revenues. But what if the public choice is not aligned with the incentives faced by the private sector? As we have already alluded, there are various tools that can slant the winning team toward the public goal. New rules or regulatory edicts can be rendered, but individual freedom and empowerment suffers. Subsidies and cost sharing can change the economics, but may distort markets and optimum resource use. Guarantees and public insurance can be issued, but more risk rather than less can result. The question is which is most effective, which is most acceptable, and which is most efficient. I prefer private decision-making for public choices rather than public decision-making for private choice. Private decision-making is a skill and a resource we should not allow to languish or go undeveloped.

A Family Example Using Insurance

The Griffin family has currently two underage male drivers. Automobile transportation is a modern day necessity and insurance is mandatory. How does the family (public) goal of safe driving and low cost transportation equate with the sons' (private) propensity for speeding and accidents. Parental rules (Rule layer) are largely ineffective *a priori* due to out-of-sight, out-of-mind consciousness and state laws against child abuse. Risk is equally unappreciated---no one expects to get caught or accidents happen to him or her. The determining layer is economic and insurance causes the slant. Mom and Dad pay for the vehicles, but the sons' pay for their

insurance costs and fines. Excessive speeding tickets provide both direct and indirect (higher insurance rates) economic disincentives. Accidents similarly have economic consequences. Plus, older four-door sedans are much more acceptable, good grades lower insurance rates, and the insurance company is both monitor and executioner. Of course, no insurance company can take over your parenting, but it can tilt the playing field and empower independent decisions that support the common (family) goal.

An Agricultural Example – Bt Refuge Management

There is a current controversy concerning the renewal or permanent registration of transgenic seedstock expressing the Bt insecticide. Organic farmers and environmental groups are concerned that the widespread adoption of Bt-technology in field crops will create resistant insects and render useless a powerful insecticide for which organic farmers have few, if any, substitutes. Major field crop seed providers see Bt-crops as a major bio-technological innovation that provides significant positive economic returns to producers. Bt-varieties, under conditional approval, have been widely accepted with a 50 percent market penetration in only three crop years since introduction.

One major method to manage (i.e., delay) Bt insect resistance is through establishment of nearby non-Bt insect refuges. The idea being that any resistant insect that might emerge from Bt acres would mate with susceptible insects from nearby refuges with overwhelming probability. NC-205 entomologists have reached a consensus and the seed industry has agreed that a 20 percent, untreated refuge should suffice for Bt-corn. The seed industry proposes to require farmers purchasing Bt-corn to plant the 20% refuge to non-Bt corn via grower agreements made at time of purchase---the rule layer. The revenue layer of the playing field is advantage 100% Bt-corn and no refuge. The risk of significant yield loss to untreated refuge acres to corn borer is also high---advantage 100% Bt-corn and no refuge. Furthermore, with multiple suppliers of Bt-corn, a producer can easily purchase 100% of his needs in Bt corn. Plus, the industry's proximity requirement is county based and not easily tracked. Looking at this playing field, there is obvious reason to suspect that the team for resistance management will have an uphill fight. While many farmers will dutifully obey the rules, the economics are potentially overwhelming.

However, an insurance program might be able to level the revenue playing field. If an insurance policy could indemnify the refuge acres to the same benefit level as the Bt corn protects the Bt acres from insect damage, the incentive not to plant refuge acres would be removed. The insurance coverage would only provide such benefits if the refuge were sufficiently large and proximate to the Bt acres to satisfy the resistance management plan. The cost of the refuge insurance would be borne in the seed cost of the Bt. Therefore, the producer in compliance with the resistance management program would receive extra benefits at least equal to the economics provided by non-compliance. The refuge insurance policy would also provide greater benefits in heavy insect outbreak years (and less in low-pressure years) just like the Bt technology (risk layer). In addition, the insurance administration would document compliance and non-compliance by a non-seed third party. Of course, this insurance solution would cost some administrative costs that would lower the net returns to Bt-users and technology owners in the short run. On the other hand, reduced returns in the short run may be made up in the long run by increasing the business life of the Bt technology and as a reasonable defense against those who desire outright prohibition of the technology.

Conclusion

Private and commercial decisions are influenced by the cumulative effects of three underlying layers---economic revenues, regulatory rules, and risk. The playing field on which private and

commercial decisions are made can be slanted advantageously toward certain goals. Private choice can be steered toward public goals through changes in any of the three layers. Reliance on a single layer does not insure success. Insurance and other risk management vehicles can be developed that change the slope of the revenue and risk layers in order to encourage private choice for public concerns. Finding those areas of opportunity is my personal challenge.

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Farmers --- Good News / Bad News



**Good News---Farmers
respond to incentives**

**Bad News---Farmers
respond to incentives**

Introduction

Title implies two points:

- **Private choice and public concern do not always coincide**
- **Insurance companies have a role**

Previous speakers

- **Private markets can internalize externalities**
- **Insurance can encourage BMP adoption**

The Company's Role

Insurance companies are financial institutions that administer the payment of claims under contractual terms (policies) from pools of accumulated financial resources mostly gathered from policyholders.

The Company's Role

Insurance companies pool risk.

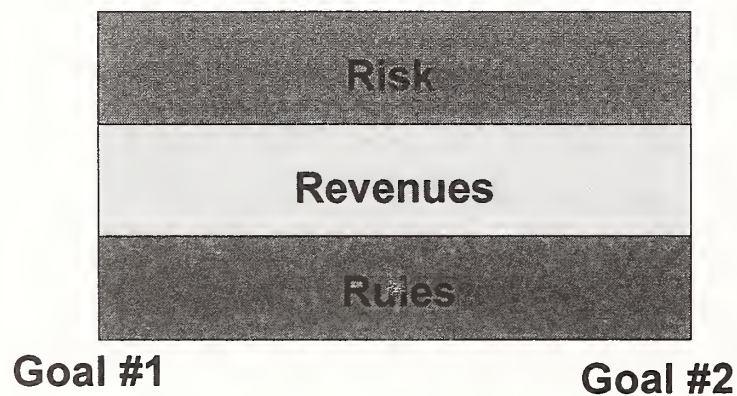
Risks are taken only to the extent that there exists some volatility in the expected results of the risk pools.

Increasingly, crop insurance companies are being called upon to take more systemic risks.

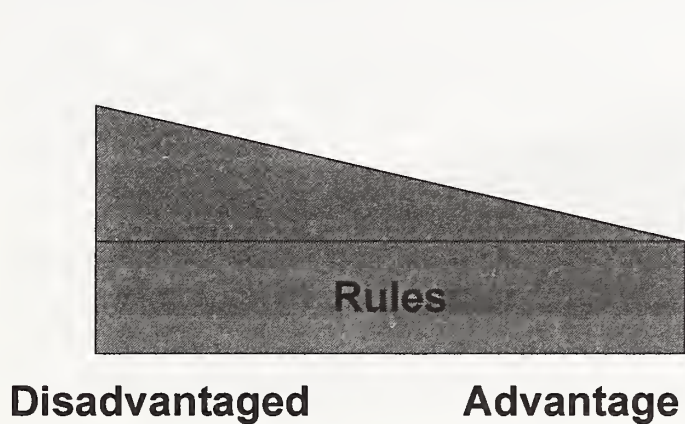
The Company Functions

- Quantifies risk
- Diagnose causes of loss
- Indemnify insured losses
- Collect information
- Monitor results

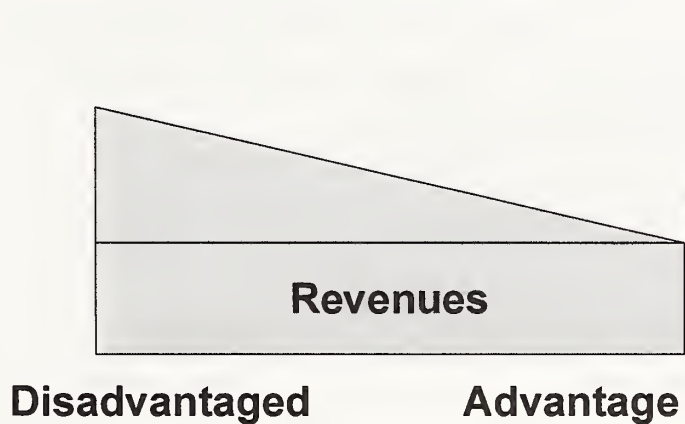
The Three R's



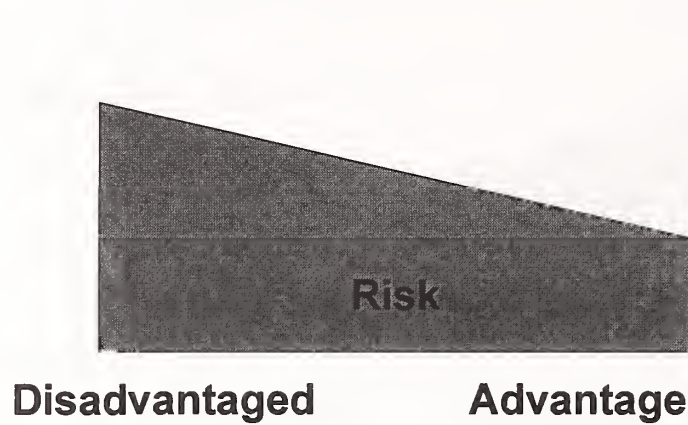
Rules can level or tilt
the playing field



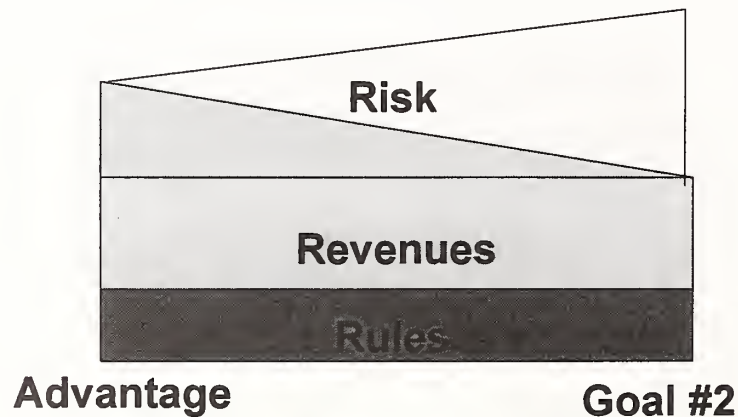
Economic incentives are
powerful



The influence of risk on decisions
is sometimes overlooked



The Level of the Playing Field is
The Sum of the Layers



Private Choice versus Public Choice

- Most cases private choice coincides with public interests

But when they differ

- Private Choice for Public Concern
- Public Choice for Private Choice

Bt Refuge Compliance

Integrated Resistance Management protocol
use insect refuges to delay insect resistance

- Bt Corn Refuges agreed at 20% of acreage
- Economic incentives to plant 100% of acres to Bt Corn (no refuge)

Refuge Insurance Levels Economics toward Compliance



Crop Scouts Inspecting Corn

- **Refuge insurance protects refuge acres with same benefits as Bt technology**
- **Insurance premium is borne in the cost of Bt seed**
- **Insurance benefits provided only on compliant refuge**

Bt Corn Refuge Insurance “Solution”



April 1, 2001

- **Better Refuges**
- **Private Choice**
- **System Approach**
- **TPA Monitoring**
- **Low Admin. Cost**
- **Registration**

Bt Refuge Insurance “Solution”



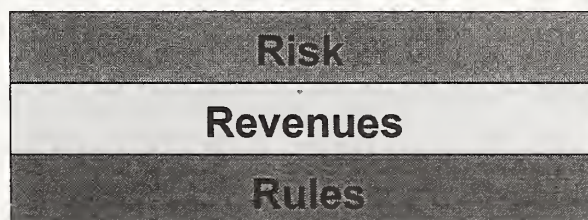
So far the seed industry has not endorsed the idea and are pursuing a pure “rule” solution via grower contracts and education.

Administrative costs do reduce short-term returns to Bt-corn users and Bt-Technology- owners.

Long term returns may be increased.

Conclusion

Decisions are influenced by three underlying effects.. Insurance can be used to tilt the economic playing field toward public goals.



Ignoring one or more layers leads to unintended consequences.

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A copy of this presentation may be received by contacting me at the above contact points or business card during the conference



IGF Insurance Company

- **Headquarters in Des Moines, IA**
- **4th Largest Crop Insurance Writer 40 States**
- **3rd Largest Crop-Hail Insurer**
- **High Growth (\$300M in '98 vs. \$36M in '93)
(67% MPCI / 33% Private)**
- **Owned by Symons International Group
(NASDAQ: SIGC)**
- **Recent acquisitions: CNA Agriculture, North American Crop Underwriters, Glenn Bros.**

THE OUTLOOK FOR U.S. LIVESTOCK AND POULTRY

Shayle D. Shagam
Agricultural Economist
World Agricultural Outlook Board, USDA

The U.S. livestock sector underwent a difficult year in 1998 as high levels of meat production coupled with a slowdown in export growth resulted in dramatic price declines in the red meat sector. Lower feed prices were insufficient to offset declining prices and the red meat sector is expected to contract in the near term as producers have reduced breeding animals. The poultry sector also faced challenges in 1998; problems with the hatchery supply flock and hot weather slowed the growth of production in the middle part of the year and the economic crisis in Russia resulted in the loss of a major export market. However, strong domestic breast meat prices and low input costs encouraged broiler producers to continue to expand although at a slower rate than in previous years.

In the absence of grain price shocks producers can expect to see moderate production costs over the next 2 years but feed costs are expected to increase through the later part of the next decade. Demand for meats from increasing incomes and growth in export sales through the period will support producer returns stimulating production growth. In the near term, biological lags will determine beef and pork production. Faced with hog prices not seen since the early 1970's producers have reduced their breeding inventories and while pork production in the first half of 1999 is expected to remain above 1998, it will likely fall off sharply in the second half of the year. Beef production is forecast to decline 3 percent this year as producers have placed large numbers of female stock in feedlots and the breeding inventory (beef cows and heifers for replacement) was estimated to be 2 percent lower on January 1, 1999. Broiler production however is expected to increase this year as producers have responded to higher prices and problems in the hatchery supply flock by increasing the number of eggs set.

Pork Production to Contract Through 2000, Then Expand

The current hog cycle traces its roots back to 1994. The liquidation of hogs as a result of low prices in 1994 resulted in a dramatic increase in prices in 1996 and 1997 as newly built large-volume slaughter plants aggressively bid for hogs. Concurrent with high hog prices in those years, grain prices fell from their high levels of 1995/96. Positive returns and optimism for the future expansion of pork exports provided substantial incentive for expansion during 1997 and 1998. The sector itself was also undergoing substantial transformation as a result of the expansion of large coordinated operations located in North Carolina and the western part of the United States. These operations had lower fixed costs per unit, different sources of outside capital and given their size were able to develop contractual marketing arrangements with slaughter plants. Thus, they were more likely to ride out short term declines in prices. Pork

production continued expanding through the fourth quarter of 1998 as constraints in slaughter capacity drove prices to their lowest levels in decades.

Despite low grain prices, the virtual collapse of hog prices in December of 1998 and continued weakness of prices through first half of 1999 will slow and reverse production growth in 1999 and 2000. Beyond 2000, production is expected to expand at about 1-2 percent per year. It is entirely possible that following the shakeout at the end of this hog cycle, the sector may have dampened the hog cycle. Production will increase at considerably lower prices than would have previously been required to trigger a response

Per capita consumption of pork on a retail weight basis is expected to decline slightly from last year's peak of 52.5 pounds per person as production declines through 2000. As production increases through the baseline period, per capita consumption will expand slowly to about 54 pounds by the end of the forecast period. Despite pork's lower cost structure, continued expansion of poultry is expected to provide considerable competition for pork at the retail level.

Pork exports expansion suffered a setback in late 1998 when continued economic weakness in the Pacific Rim was compounded by the collapse of Russia as an export market. Although the donation of pork to Russia in mid-1999 will provide some benefit to the export sector, weakness in the Pacific Rim and Russia will temper export growth through the early part of the next decade. Further competition is expected from the EU which finds itself in an oversupply situation and Canada where pork production is expected to expand. Nonetheless, by the end of the forecast period, U.S. exports are expected to reach about 1.9 billion pounds, 50 percent higher than the 1998 level.

Beef Market Share Continues to Slide

The beef sector continues to adjust to the higher corn and hay prices of 1995/96 which resulted in low feeder cattle prices during late 1995 and 1996. Low returns for cow calf operations caused a reduction in female stock and poor forage in the south kept producers from rebuilding breeding herds in 1998. Despite over 2 percent lower slaughter numbers in 1998, abundant forage in the northern part of the country led to calves remaining on grass longer and boosted slaughter weights and thus beef production. The January 1, 1999 survey of cattle producers indicated that although heifer and cow numbers were lower than 1998, producers were retaining few heifers for replacement. With continued large numbers of cattle placed on feed at the end of 1998, beef production will remain high through early spring before declining 4 to 5 percent in the second half of 1999. Production may fall 3 percent for the year.

Reductions in cattle inventories are expected through 2000. Recovery in cattle inventories is expected to begin in 2001 but the beef sector is likely to come under increasing pressure from expanding pork and poultry production at even lower relative prices. The changing structure of those industries has allowed them to expand production while providing consumers a consistent product at a competitive price. In the beef sector, the highest prices will be received for those animals whose meat is destined for export or domestic hotels and restaurants. As beef is forced to remain competitive with pork and poultry at the retail level, producer returns will not be sufficient to encourage an expansion to this cattle cycle's 1996 peak. The cattle cycle is forecast to peak in

2003 at 99 million head. After breeding herds are rebuilt in 2000 and 2001, production will increase but is expected to hover at 24.5 million pounds through 2008.

In this cattle cycle, per capita retail weight consumption of beef peaked last year at 68 pounds and is expected to decline gradually to about 58 pounds by 2008. Lower beef production will reduce available supplies in the near term and the expansion of exports later in the forecast period will siphon supplies away from the domestic retail market.

The financial crisis in Asia and tightening supplies of beef in the U.S. during 1999-2001 will limit the expansion of beef exports. Exports in 1999 will be boosted by donations to Russia but steady increases in U.S. prices and continued weakness in the Pacific Rim will temper gains. Mexico is expected to remain a strong market for U.S. beef and as Asian markets recover later in the forecast period, U.S. exports can be expected to grow at about 3 percent per year. Imports will expand over the next several years due to demand for manufacturing beef but after the U.S. cow herd is rebuilt and cow slaughter rises, imports are expected to gradually decline. The U.S. will likely become a net beef exporter in the latter part of the next decade.

Broiler Production and Trade Growth Slower through 2008

The rate of growth in broiler production slowed in 1998 due to high temperatures in the southern portion of the United States and problems in the broiler hatchery supply flock. Strong price pressure might have been felt after the devaluation of the ruble in August virtually halted exports to Russia but high prices for breast meat offset the potential price declines from an oversupply of leg quarters. Thus composite prices remained strong. High bird prices and lower feed prices encouraged producers to expand production. Broiler production in 1999 and 2000 is expected to expand about 5 percent per year.

Growth in broiler production beyond 2000 is forecast to average 3-4 percent through 2008, well below historical rates. Changes in industry structure and technological innovation have allowed the poultry industry to keep production costs from rising as rapidly as in other sectors. However, further technological improvements and vertical integration are forecast to occur more slowly through the baseline period. In addition, increasing market share will become more difficult as total poultry has to compete with increasing quantities of competitively priced pork. Nonetheless, retail broiler consumption is expected to reach 98 pounds per capita by 2008.

In 1998, broiler exports suffered their first decline since 1984. The loss of Russia as an export market in August was too great to be offset by increases in other markets. Exports are expected to decline again in 1999 but gradually increase beginning in 2000. Growth in the future will be tempered by the speed of recovery of Russia and Asia as markets for poultry.

Turkeys Under Pressure

Turkey producers faced 2 years of negative returns which reduced production in 1998 and is expected to limit production in early 1999. Although turkey prices will remain weak relative to the past several years, declining feed prices will boost producer returns and encourage a moderate expansion through 2002. After that, feed cost increases will outpace increases in turkey prices

and production after 2003 will likely increase less than 1 percent per year. Although exports will increase from last year's depressed levels, growth will be slow due to competition from moderately priced pork trimmings. Competition from hams on the domestic market is expected to be strong and in the face of large pork supplies, per capita turkey consumption may decline slightly over time.

Eggs Consumption Stable

Egg production has been fairly profitable and egg production increased almost 3 percent in 1998 and is expected to rise another 2-3 percent in 1999. Per capita egg consumption is forecast to be relatively stable at about 246 eggs. This stability will reflect increases of egg products through consumption of prepared foods. Shell egg consumption is expected to decline slowly through the forecast period.

CANADA'S OUTLOOK FOR LIVESTOCK AND POULTRY

Stéphan Gagné

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INTRODUCTION

Baseline Process

Agriculture and Agri-Food Canada's (AAFC) medium term policy baseline draws on the work of several other publications. The international baseline is based on the Organization for Economic Co-operation and Development's (OECD) *Agricultural Outlook* (1998). Other world agricultural outlooks consulted during the preparation of this baseline include the Food and Agricultural Policy Research Institute (*FAPRI 1998 International; Outlook*, and *FAPRI 1998 U.S. Outlook*), and the United States Department of Agriculture's (USDA) *International Agricultural Baseline Projections to 2007* (February 1998).

Canadian macroeconomic projections are taken from the Conference Board of Canada's *Autumn 1997 Forecast*. World macroeconomic assumptions are based on projections embedded in the OECD's *World Agricultural Outlook*, the International Monetary Fund's (IMF) *World Economic Outlook, October 1997*, and the IMF's *Interim Assessment, December 1997*.

The publications mentioned above are crucial inputs in the Canadian baseline process. Because of the size of its economy and agricultural sector, Canada is considered as a "price taker", which means that Canada does not have any impact on world agricultural commodity prices. FAPRI, USDA and the OECD are in the process to finalize their 1999 baseline. Other factor that contributes to delay the 1999 Canadian baseline process is the fact that Statistics Canada will release 1998 cattle and hog inventories on February 25, 1999. For all these reasons, the 1999 Canadian baseline will only be completed in May of this year. What is presented below, is extracted from the 1998 Medium Term Baseline.

The 1998 baseline also incorporates comments received at a Canadian/industry consultation workshop, held in Ottawa on December 15, 1997. Workshop participants included representatives from federal and provincial governments, and industry organizations.

SUMMARY

This document provides a summary for a plausible policy baseline for Canadian livestock and poultry sectors over the next 10 years (1998-2007). It assumes stable world macroeconomic and political conditions, normal weather patterns, and a status quo international and domestic policy environment. Although the baseline is expressed in terms of single numbers, its projections are best interpreted as midpoints of ranges. For this reason, the reader should refer to the major directions, turning points, and trends

indicated by the baseline, rather than the specific values.

Macroeconomy Baseline

Key Assumptions

World:

- Growth in developed economies is moderate in this baseline (2-3%)
- For developing economies, growth is stronger (5-6%)
- This baseline incorporates "modest Asian crisis"
- Inflation declines for most regions (developed countries below 3%; single digits for developing countries)
- This baseline assumes realignment among the major currencies. The US dollar strengthens against the ECU and currencies of most developing countries.

Canada:

- This baseline shows modest, but stable growth for the Canadian economy, with annual GDP increases averaging about 3%.
- The prime interest rate remains low, averaging 5.5-6% over the medium term.
- Inflation remains modest, with annual increases in the consumer price index (CPI) below 3%.
- Expected appreciation of the Canadian dollar at the end of the outlook period.

LIVESTOCK AND POULTRY BASELINE

A) Red Meats

Key assumptions

While the elimination of Foot and Mouth Disease (FMD) in Mercosur countries (principally Argentina and Uruguay) has potentially significant implications for world beef markets, it was not taken into account in this baseline.

The FMD outbreak in the Taiwanese herd in 1997 has temporarily removed this major exporter from the market. This baseline assumes that Taiwan gradually re-enters the Asian export market beginning in 2001.

Major Highlights:

A return to growth in the breeding herd is expected from 1998 to 2003. In the short term, it will keep total exports of meat (including live animals in meat equivalents) below the record high of 1997. Over the medium term, it will generate growth in total exports of 10% above 1997 levels.

Cattle prices were low as production in North America reached the peak of the cattle cycle, but began to increase in 1997 and are expected to rise up to 2001. Thereafter, prices fall as the next peak of the production cycle is reached.

Grain transportation reform that took place in 1995 and low grain prices appear to have had a positive impact on cattle breeder competitiveness. For the first time since 1985, net trade of beef (excluding live animals) from Canada was positive in both 1996 and 1997. Net trade of beef is projected to remain positive over the baseline period.

Major investments over the baseline period will increase slaughtering capacity in Canada. Meat exports in 2004 are expected to be double the average for 1993-97. Exports of live animal to the US will decline as more cattle will be processed domestically.

Hog production shows strong growth over the long term, particularly in Western Canada where some of the anticipated growth in capital investment is already beginning to take place.

Pork prices in 1996 were at the high point of the price cycle. Price strength was further re-enforced in 1997 by supply problems in key exporting countries such as swine fever in the Netherlands, and FMD in Taiwan. Over the long term, pork prices are expected to decline due to continued productivity gains, particularly related to the restructuring of the industry in the U.S. and Canada.

The baseline shows domestic slaughter continuing to increase in line with increases in domestic packing plant capacity. As a result, live cattle and hog exports to the U.S. decline.

Currently, Canadian beef exports are mainly to the U.S.. Canada is a net exporter of low quality beef to the U.S. and a net importer of high quality beef from the U.S.. The relationship is reversed on the world market where Canada is a net exporter of high quality beef (largely to Japan) and a net importer of low quality beef (mainly from New Zealand and Australia). Trends in exports indicate increased low quality beef to the U.S. and increased high quality beef exports to the rest of the world.

Live pig exports to the U.S. have averaged 180 kt per annum since 1996 and are expected to drop significantly as slaughter capacity in Canada increases. Exports of pigmeat will increase as more hogs are processed domestically. The quantity of pigmeat (including live animals in meat equivalent) exported in the U.S. will remain at current levels but exports to non U.S. destinations will increase. Recently, 75% of the exports have been going to the United States, but it is expected that this will drop below 50% by the end of the outlook period.

B) Poultry

Major Highlights:

International poultry prices decline initially from current high levels, but then increase over the baseline, in line with changes in grain prices. Poultry meat consumption in developed and developing countries continue on a strong growth trend.

Canadian poultry production increases at an average of 3% per year, based on the expected rate of growth in domestic consumption.

Poultry prices continue to increase over the baseline, reflecting changes in the cost of production formula.

1998 Baseline Review and Uncertainties

Baseline Review:

- New international baseline (Asian flu, Russia meat imports decline);
- New Canadian macroeconomic baseline with low Canadian dollar;
- Impacts of the pork crisis on Canadian hog producers;
- Significant increase in slaughtering capacity in Canada (Maple Leaf plant in Brandon, Manitoba)
- For the first time, the opportunity now exists for U.S. hogs to be shipped to Canada since the Government of Canada implemented (December 1998) new regulations which permit the importation for immediate slaughter of U.S. hogs from states which have achieved freedom of pseudorabies.

Uncertainties:

- Agricultural policy: Agenda 2000, WTO negotiations
- The impacts of changes in world markets on domestic agricultural production represents another area of uncertainty as world agricultural markets continue to liberalize.
- Biotechnology: Genetically Modified Organisms (GMOs)
- Weather: El Nino, La Nina

Juan Manuel Galarza y Mercado, Director-General
Center for Agricultural Statistics, SAGAR

Situation & Outlook of main grains & livestock in Mexico.



Washington, D. C.
february 23, 1999



SNIA FOUNDATIONS

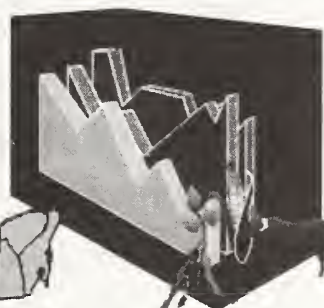


STRATEGIC

- ✓ Federalization
- ✓ Cooperation & Coordination
- ✓ Training

TECHNOLOGY

- ✓ Geographic
- ✓ Statistics
- ✓ Information Technology
- ✓ Agricultural Economics



SNIA KEY TO AGRICULTURE INFORMATION

Background

- Situation & Outlook

1990-1998 of:

- Sorghum
- Corn
- Wheat
- Beef
- Pork
- Chicken
- others



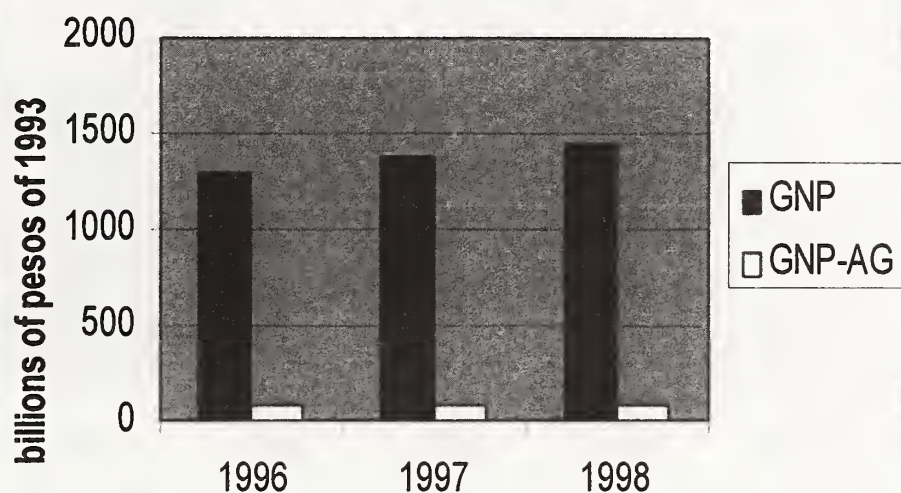
Emergin Markets

Joint project USDA-SAGAR

Goals of “Alianza para el campo”

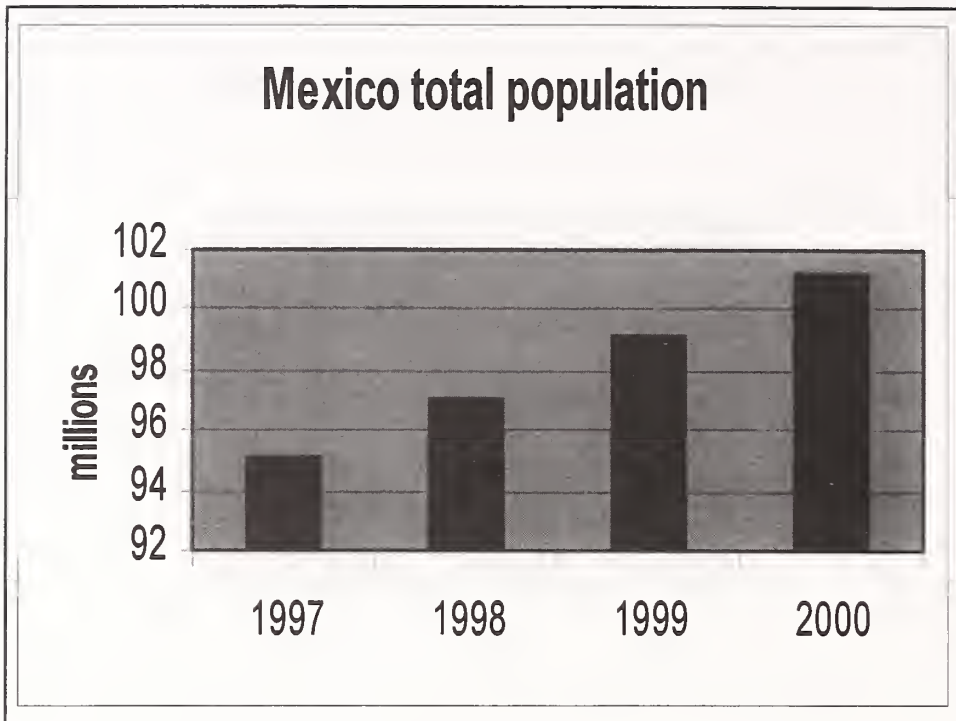
- Increase producers income
- Fight rural poverty
- Increase agricultural production above population growth
- Contribute to food safety
- Overcome the trade deficit of agriculture

Total and Agriculture GNP



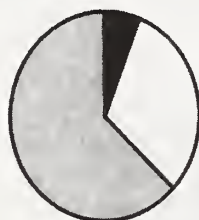
GNP in billions of pesos of 1993

year	GNP	GNP-AG
1996	1293.9	76.6
1997	1381.4	76.8
1998	1447.9	77.1



Mexico population in millions	
1997	95.1
1998	97.1
1999	99.1
2000	101.2

Land according to weather



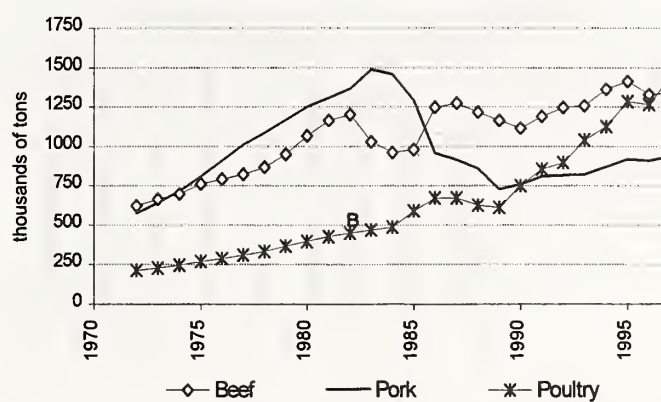
- Humid zones
- Semihumid zones
- Semidry zones
- Dry Zones

Clasification according to use

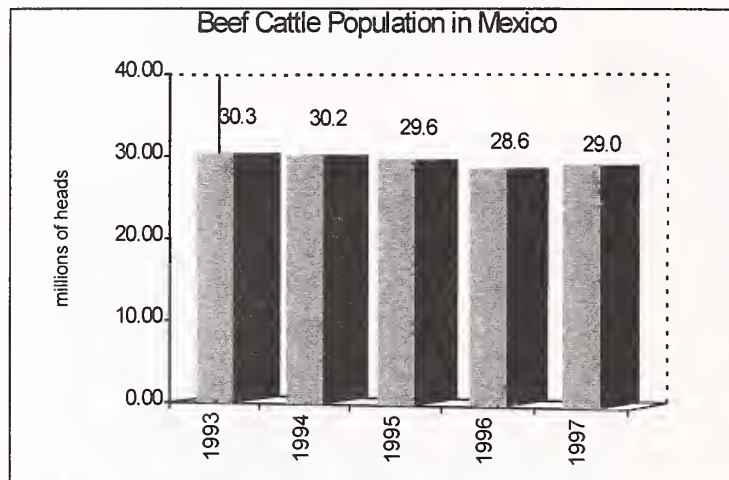


- Agriculture
- Forest
- Pasture
- Others

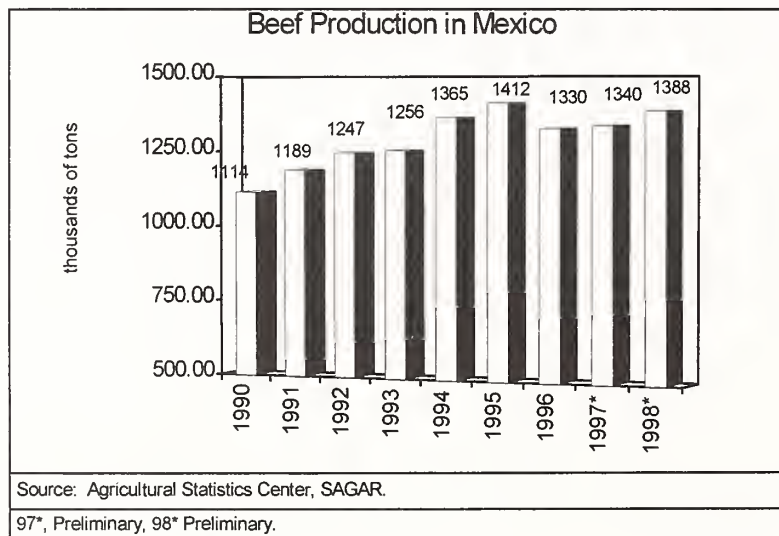
Meat Production in Mexico, 1970-1997



Source: SAGAR.

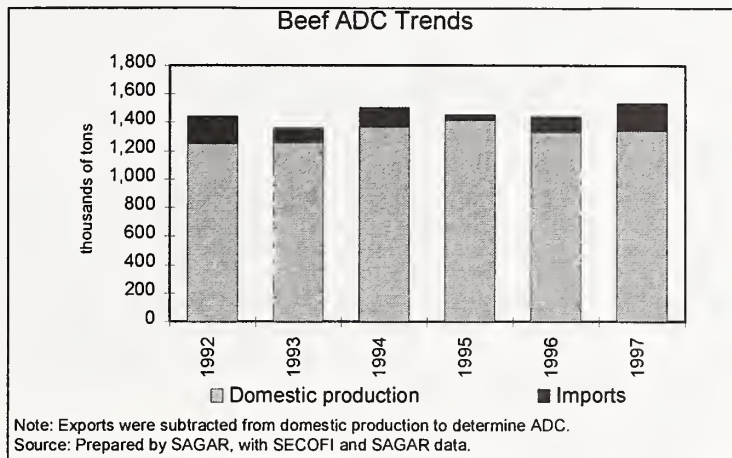


Source: Agricultural Statistics Center with data from SAGAR delegations



Source: Agricultural Statistics Center, SAGAR.

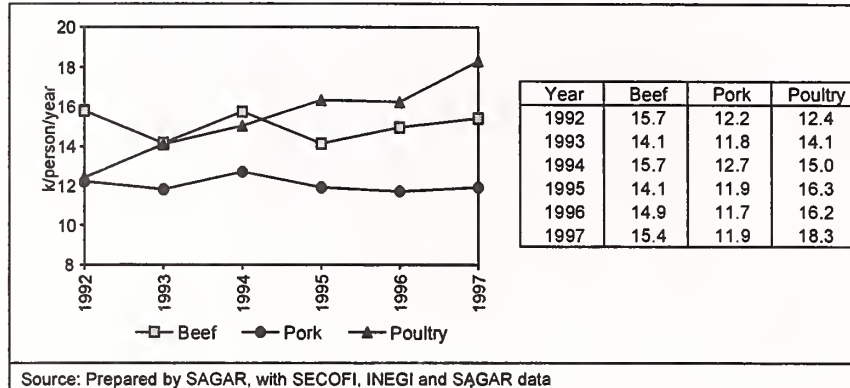
97*, Preliminary, 98* Preliminary.



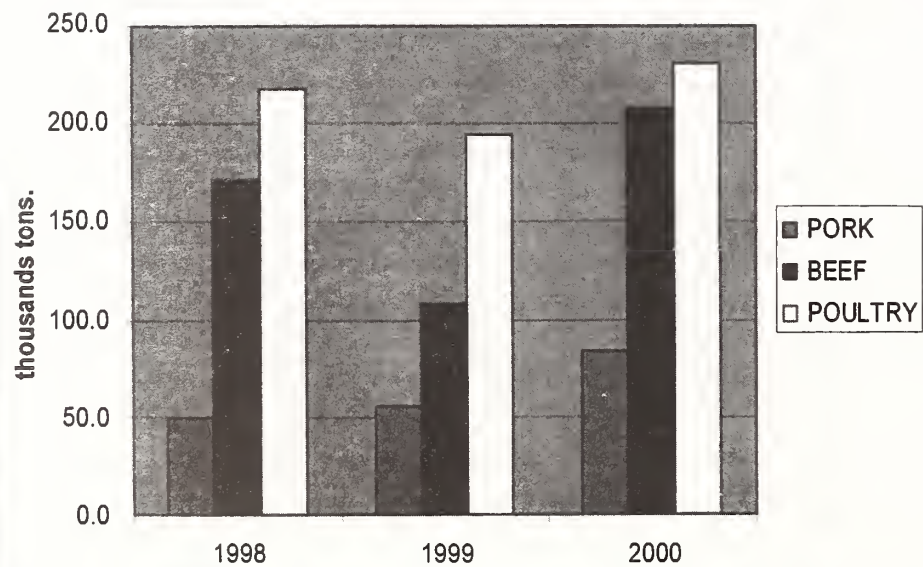
Beef ADC Breakdown		
Year	Domestic Production	Importation
1992	85.30	14.70
1993	91.64	8.36
1994	89.98	10.02
1995	96.75	3.25
1996	92.07	7.93
1997	86.57	13.43

Source: SAGAR, with SECOFI and SAGAR information.

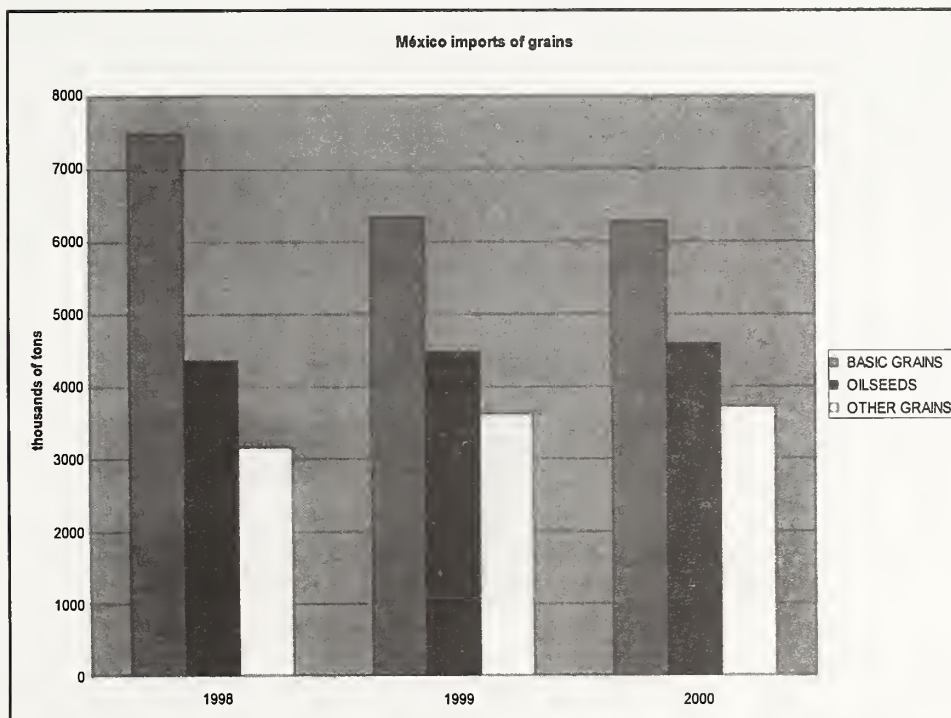
Meat Availability Trends Based on ADC



Mexico imports of meat



Mexico imports of meat			
	1998	1999	2000
PORK	50.0	56.0	84.0
BEEF	172.0	108.0	208.0
POULTRY	218.0	194.0	230.0
MEAT	440.0	358.0	522.0
		thousands tons.	



Mexico imports of grains
in thousands of tons.

	1998	1999	2000
BASIC GRAINS	7495.3	6326.2	6273.6
OILSEEDS	4366.6	4476.8	4606.2
OTHER GRAINS	3161	3617.6	3726.9

SOUTH AMERICAN INFRASTRUCTURE IMPROVEMENTS

Gregory L. Guenther
Director, National Corn Growers Association

U.S. agriculture is currently at a crossroads. In agriculture, we depend on foreign trade for our prosperity. We have enjoyed an immense advantage over our competitors for many years. Today, we are on the verge of losing that edge and plunging our agricultural sector into an economic crisis that makes the effects of the Carter embargo of the eighties look like a minor correction in the futures market. The competitive advantage I am talking about is our transportation infrastructure. As we in the U.S. argue about the relative merits of rail Vs. barge, and the potential economic gains Vs. the environmental costs, the governments of South America are busily eroding our competitive advantage, and not slowly either.

The areas that I want to discuss with you today are Production Practices, River, Rail and Road improvements, primarily in Argentina, but the same changes are taking place throughout most of the South American Continent.

Production Practices:

The South Americans have the ability to dramatically increase production virtually any time they want to. Increasing acceptance of commercial fertilizers primarily Phosphate and Nitrogen combined with new varieties of corn bred especially for Argentine growing conditions will soon increase national average yields from the 90 Bu/a. they now produce to close to the 130 Bu/a we enjoy here. As yields improve and the income stream increases, less land will be seeded to alfalfa or pasture, and put into grain production. The construction of what will be the worlds largest nitrogen manufacturing plant soon to be completed in Bahia Blanca south of Buenos Aries on the coast will provide Argentine farmers with a inexpensive supply of a domestic fertilizer critical to corn production.

Increased availability of storage, both on-farm and commercial, will give the Argentine grain industry much needed flexibility on when and how they market their crops. This will primarily impact corn and wheat exports as soybeans are crushed or processed locally at the ports and shipped out of the country primarily at harvest. The Argentine government offers significant credits for the export of processed soybeans. Their goal is to keep the economic development inside their own borders. There are no incentives for corn. Corn is exported as a whole grain with little or no processing. Currently virtually none of the domestic corn production goes into cattle feeding. This may change, but right now all domestic beef is grass fed.

As the Argentine economy recovers the larger farms formed by small farm failure will have easier access to capital. (In December 1997 when I was there farmers were able to borrow Pesos for the first time in years.) These larger farms will use that capital to increase inputs such as fertilizer, better seed genetics, more herbicides and larger more efficient equipment to further increase production. Expanding market access through Mercosur will reward them handsomely for the risks and the investment.

Road and Truck Improvements:

The main road system in Argentina is little different from what we enjoy in our country. The fact that many of the side roads are dirt and unpaved is not significant. Most of the grain is transported at harvest and the weather window for harvest is much wider there than it is here. The roads are passable when they need to be and an inconvenience, no more during the off seasons. The majority of the corn is grown within 300 km. (200 miles) of the ports. Trucks are the main method of hauling grain that distance. Other people who have been in Argentina have laughed at the trucks that haul the grain from the fields and farms to the export terminals. I was not amused. Their system works quite well for them and everything is designed around the trucks which have no hydraulic dumping system. The trucks and trailers are relatively simple and inexpensive. And most importantly, they work. Numerous trucking firms exist and requests from a farmer who is in harvest for 150 to 200 trucks is not uncommon and easily filled. The truckers live in their trucks and a wait of one to three days at the terminal to unload is not remarkable.

Rail Improvements:

The Argentine government has undertaken a major project to privatize the railroads in the country. While maintaining ownership of the tracks and land, fifty-year leases are being let on a competitive basis. One of the conditions of the lease is that the track is in better condition at the end of the lease than at the beginning. Most operators are not finding this hard to do. The railroads are building alliances with U.S. companies to improve their ability to offer service. This sector of transportation is still somewhat slow but gaining momentum rapidly. The difference in track gauges is being overcome with a number of ingenious methods. They have developed a method of lifting the cargo boxes off of the trucks (railroad wheels) and placing them on trucks of another gauge with a crane, another method is to use pits and conveyer belts to rapidly off-load one train onto another. The largest Argentine railroad recently merged with a Brazilian railroad company.

Ports and Deep Draft Channel Improvements:

Argentina has undertaken a \$650 million dredging project to allow Panamax (50 K metric ton) vessels access to interior ports at Santa Fe and Rosario. The export terminals at Buenos Aires that once served the ocean vessels are gone. Up-river competition has ended their usefulness. Additional dredging will allow even Cape sized vessels (110K to 120K metric ton) access to these ports as well. The grain export terminals have been privatized and investment for improvements and upgrades are pouring into this sector of their economy. These ports are operated in a highly efficient manner at a good profit margin. Additional soybean crush capacity is being added. There is a competition going to determine who will process and ultimately export the additional soybean acres being grown in Brazil. The Brazilian government would like to move those beans east to their coast and process them in Brazilian plants. The Argentines are making every effort to entice them south. In addition to the growing acres in Central Brazil, the soybean regions of Bolivia and Paraguay are now connected to Argentine processors by barge.

River and Barge Improvements:

The governments of Argentina, Brazil, Paraguay and Bolivia have formed a partnership to improve navigation on the Parana and Paraguay rivers. \$60 million dollars have been invested in these river systems to enhance navigation. Currently a towboat can travel 1800 miles without lock delays. There are no locks. A U.S. based company, American Commercial Barge Lines is the largest barge line operating in South America. Many of the new barges manufactured in the U.S. over the last 5 to 7 years have gone to South America. ACBL has initiated round-the-clock navigation on the river system. Operating 15 barge tows for most, if not all of the river system. Shipments that used to take 10 to 12 days now take 4 to 5 days. Soybeans from the above mentioned countries all flow by barge to Argentine crushers in a very cost competitive manner.

U.S. Shortcomings:

Where does that leave us? The majority of the locks and dams on the Mississippi and Illinois River system surpassed their useful life 20 years ago. Improvements in towboat capacity and improvements in other areas of the navigable river system have rendered them obsolete. They are too short, too slow and over utilized. Delays on the river system cost producers over \$20 million dollars a year in higher shipping costs and the number continues to climb.

Rail consolidation and increases in movements of competing commodities will quickly drive grain-shipping rates skyward. We have already experienced this with the UP SP merger that left us with only two viable railroads west of the Mississippi River.

The U.S. is in very real danger of becoming a residual supplier of food and fiber to the world. The past year has taught us that the export market is vital to the health of agriculture and rural America. As our competitive edge erodes, other countries like Argentina will quickly step in and fill the voids with cheaper commodities due to their more efficient transportation systems.

What can we do???

There are seven locks that need to be upgraded five years ago. They are Lock and Dam 25, 24, 22, 21 and 20 on the Mississippi River and La Grange and Peoria locks on the Illinois River. These locks need to be upgraded to 1200 foot chambers to allow a barge tow to pass through intact without making two passes as they are currently forced to do. We need to ensure that the COE maintains the mandated channel depths that allow the most efficient loading of all barge traffic. This includes proper management of the Missouri River and the waters that feed it as well. We also need to support the COE budget for current and deferred maintenance. We need funding, authorization and a commitment to build these structures in a timely and cost efficient manner that is not possible under current budget processes. And we need to pursue this agenda aggressively and constantly until we achieve these goals.

EVOLUTION OF AGRICULTURAL PRODUCTION IN LATIN AMERICA

Dr. Michael Cordonnier
President, Soybean & Corn Advisor, Inc.

Over the last two decades, Brazil and Argentina have emerged as major agricultural competitors of the United States particularly in the production of soybeans and corn. Commercial soybean production was first introduced in Brazil in the early 1960's and Brazil has now developed into the world's second largest soybean producer. Argentine agriculture has evolved from a pastoral beginning to one now emphasizing row crop production. Argentina is now the second largest exporter of corn in the world and a major producer of soybeans. In my brief comments today, I will highlight the major factors contributing to the rapid development of the agricultural sector in these countries, some of the key developmental trends in recent years and what lies ahead for agriculture in Brazil and Argentina.

How did Brazil and Argentina emerge as leading world agricultural producers in such a short period of time? The answer to this question is that both countries took advantage of their natural strengths. Brazil's most obvious advantage is the tremendous land mass encompassed in this the fifth largest country in the world. Brazil is 9% larger than the continental United States and most of the country enjoys a wet tropical climate. The major area of agricultural expansion thus far has been in the Cerrados Region of central Brazil. These savanna-like lands are characterized by short twisted trees interspersed by sparse grass. The price of this Cerrado land is relatively cheap and they are easily cleared and converted to mechanized agricultural production. In their native state the Cerrado soils are quite infertile, but regular application of lime and fertilizer can make them relatively productive.

Brazilian farmers have also been very quick to embrace new technology and adapt it to their own situation. Leading this new technology has been the development of superior varieties suitable for tropical environments. Brazilian scientists have done a superb job of developing germplasm that excels in the hot tropical climate of central Brazil. Brazilian farmers have also been quick to adopt improved tillage practices such as no-till and pest management practices utilizing the newest herbicides and insecticides. And lastly, with the end of hyper inflation, Brazilian farmers now have expanded marketing options encompassing a new futures exchange in Sao Paulo.

Argentina's major agricultural strength stems from its fertile Pampas soils. This broad expanse of flat and fertile grassland is easily converted into excellent agricultural production. As a testament to the soil's native fertility, Argentine farmers have developed over the years a long term rotation strategy that maintained the native fertility of the soil to such an extent that commercial fertilizers were rarely used. Recently, Argentine agriculture has moved to more of a corn and soybean rotation similar to that of the United States and now the native fertility must be supplemented by commercial fertilizers.

Argentina has several other more subtle advantages. First, any advances in agricultural technology developed in the United States is generally directly transferable to Argentina since the soils, climate and latitude of Argentina are very similar to those of the United States. Secondly, Argentine producers also have an advantage in that the major agricultural production regions of the country are in close proximity to domestic markets and export facilities thus greatly reducing transportation costs. These advantages allow Argentina to be the low cost producer in South America.

In recent years there has been several major trends that have been key in propelling South America to the forefront of world agricultural development.

1. New lands being brought into agricultural production.

This trend has been particularly evident in Brazil where the major expansion has been occurring in the central regions of Brazil primarily in the states of Mato Grosso, Mato Grosso do Sul, Goias, Minas Gerais, Tocantins, Bahia, and Maranhao, Piaui, and Rondonia. The majority of the new production has been carved out of the Cerrado land which is cheap and quite easily converted to agricultural production. This trend has been accelerating in recent years and shows no signs of slowing down.

Agricultural development has been the primary driving force behind this rapid northward expansion in Brazil. The vast majority of this land is converted to either pastures or row crops with soybeans being the major crop planted in these areas. Other forces driving this expansion are logging and mining, but they play only minor roles compared to agriculture. There still remains in Brazil hundreds of millions of acres of land that could potentially be converted to agricultural production. The speed at which this land could be converted to agricultural production will depend on a complex set of factors including governmental land use policy, fiscal policy, world commodity prices as well as social, cultural and environmental concerns.

This conversion of new lands into agricultural production is not limited to Brazil. In southern Paraguay and eastern Bolivia a similar trend has emerged in recent years. In fact, much of this conversion has been driven by Brazilian farmers who move into these areas searching for new land to produce soybeans. This trend has been exhibited to a lesser extent in Argentina where the expansion of agricultural production outside of its core area of the Humid Pampas has been limited by unfavorable climatic conditions.

2. Rapid adoption of new technology.

Brazilian and Argentine farmers have become very proficient at adopting new technologies as soon as they have become available. This trend is most obvious in availability of new varieties, tillage practices, pest management and machinery. Whatever is available to the U.S. farmers is generally available to the producers in South America. Much of this technology transfer has been aided by the fact that the same agribusiness companies that develop and market these technologies in North America market the same products in South America. This has allowed the South American farmers to make very rapid progress in improving crop yields. Today, soybean yields in Brazil and Argentina are approaching the levels of the United States.

3. Emphasis on infrastructure improvements.

The biggest impediment to rapid agricultural expansion in Brazil has been a lack of adequate infrastructure- roads, rail lines, water transport and port facilities. The topography of Brazil has made this infrastructure development quite difficult. Mountains along the coast of Brazil forces the major rivers to run west toward the interior of the continent. This has hampered the development of any type of water transportation system to coastal port facilities. It has also made the building of highways and rail lines more difficult.

To address this problem, the Brazilian government has turned to the private sector. Major highways in Brazil are being converted into toll roads operated by private companies in the hope that they will be better able to build and maintain the roads than the cash-starved local and federal governments. The government has also given incentives to the private sector to develop rail lines and water transportation systems into the interior of the country. New port facilities have been built on the Amazon River and a rail line is being extended into the heart of the expanding agricultural area. Established port facilities are now being privatized in order to improve their operations and make them more competitive. All these are efforts to overcome the biggest problem facing Brazilian agriculture - transportation.

Argentina has also recognized the advantages offered by efficient transportation and has taken steps to strengthen that sector. Major highways were converted into toll roads several years ago and the result has been a dramatic improvement in the condition of these roads. Dredging of the Parana River and improvement and expansion of port facilities at the city of Rosario has made this city the center of Argentina's agricultural export activity. This infrastructure improvement in Argentina has been much easier than in Brazil because of the concentrated nature of Argentine agriculture. In Brazil, the agricultural expansion is occurring 1,500-2,000 kilometers away from the primary domestic markets and export facilities. In contrast, 75% of Argentina's agricultural production lies within a 300-400 kilometer radius of the city of Rosario. The topography of the area is also very flat which has facilitated this development of this infrastructure.

4. Global markets.

In recent years, it has become much more evident that the South American farmers have become integral partners in the global agricultural economy. Today, it is not uncommon to see a rapid pace of export of soybeans and soy products out of Brazil immediately after harvest and then to later have imports of soybeans into Brazil to supply its domestic needs. This globalization is also evident in the United States when poultry producers in the Southeastern U.S. find it advantageous to import cheaper Brazilian soybeans than more expensive soybeans from the Midwest.

This free flow of agricultural commodities has been aided by the fact that many companies involved in this commerce have operations in both North and South America. With continued consolidation in the agricultural sector, this integration of global markets is certain to accelerate in the future.

The question before us today is to try to determine what lies ahead for these two major competitors of the United States. What trends do we see emerging as the driving force behind the continued agricultural development in Brazil and Argentina?

1. Continued agricultural expansion.

In the last several decades, Brazilian agriculture has emerged as one of the major driving forces in this the eighth largest economy in the world. With its huge land mass, favorable climate and energetic agricultural sector, there is no indication that agricultural expansion shows any signs of slowing down. Commodity price fluctuations could speed up or slow down this process, but it is certain that the expansion will continue. It is a natural progression of events to push the agricultural frontiers further and further into the new lands of Amazonia and beyond.

This agricultural expansion will continue to impact the agricultural sector here in the United States especially the U.S. soybean producers. Soybeans have been the primary driving force behind much of this expansion in Brazil and they will continue to do so in the future. Soybeans offer many advantages over other crops in Brazil. They are well adapted to the soils and climate of the region, productivity is comparable to the U.S., the price of the crop is based on world markets and the crop offers excellent liquidity. And lastly, Brazilian farmers like to grow soybeans. They are very good at producing soybeans and soybean expansion in Brazil shows no signs of abatement. No comparable argument can be made for any other crop in Brazil.

In Brazil, soybeans are produced primarily as a monocrop. Less than one third of Brazil's soybean crop is rotated to other crops in any given year and in the new expansion areas the percentage is even less. Therefore as agricultural expansion continues in Brazil, soybeans will be the major beneficiary of this expansion. This continued expansion of soybean production in South America could have a significant negative impact on the ability of U.S. producers to maintain their share of the world's soybean market.

Agricultural expansion in Argentina is less straight forward. Expansion of row crops in Argentina in recent years has come at the expense of cattle production. Bringing new lands into production in Argentina is not a common occurrence. It is more a function of a reshuffling of existing area into different crops. The shift away from beef production into row crops such as soybeans, corn, sunflowers and cotton appears to be accelerating and is expected to continue unabated. As in Brazil, price fluctuations can temporarily affect the speed of this transition, but not detour it.

2. Infrastructure improvements and privatization.

As agriculture has expanded into central and northern Brazil the lack of adequate infrastructure has become painfully obvious. To correct these shortcomings the government has embarked on an ambitious program of cooperation with the private sector to address these issues. This has included turning over the operation of major highways to private companies, aiding in the purchase and development of land for new rail lines, sharing part of the cost of new water transportation systems and privatizing utilities and port facilities. All this is being done to lower

the cost of production and improve the efficiency by which agricultural commodities are transported throughout the country.

The Brazilian government has reluctantly realized that its role in this process should be one of coordination and oversight and not of actual implementation. The private sector has demonstrated that it is capable developing and managing these assets much better the federal government. This is a major shift in governmental policy in Brazil which is certain to have a lasting impact on the success of how this critical issue is addressed in the future.

3. Biotechnology specifically designed for the South American market.

Until now, the agricultural sector in South America has been the beneficiary of biotechnology research geared toward the North American market. To their credit, the farmers in South America have been quick to embrace this new technology and adapt it to their own particular situation. This has encouraged companies conducting this type of research to consider developing products specifically designed for the South American market.

Major biotech companies have announced plans to build research facilities in Brazil to work on not only the major row crops of the region such as soybeans, corn, rice and cotton, but also important South American crops such as citrus, coffee, cacao and sugar. This focused emphasis on South America will likely result in improved agricultural production in the region.

As we have seen, Brazil and Argentina have made remarkable progress in recent years in expanding and improving their important agricultural sector. Many of the same forces that have aided in this development in the past will continue to play critical roles in the future. It is important for American farmers to realize that this agricultural expansion in the Southern Hemisphere is not a temporary phenomena. Rather, it is based on solid economic reality and it is certain that it continue into the future.

MACROECONOMIC, TRADE AND SECTORAL ISSUES IN THE AGRICULTURE OF LATIN AMERICA AND THE CARIBBEAN

Eugenio DIAZ-BONILLA
Visiting Research Fellow
International Food Policy Research Institute

I MACROECONOMICS AND AGRICULTURE IN LAC

(a) Brief macroeconomic background ^{1/}

World macroeconomic and agricultural cycles have had a major impact on the economies of LAC countries and on the behavior of the agricultural sector in the region. During the 60's and 70's, LAC countries benefitted from the overall buoyancy of the world economy. There were indeed discussions regarding the adequacy and sustainability of the development strategy based on import substitution industrialization (ISI) (which was criticized because its negative impact on growth, macroeconomic stability, technological innovation and income distribution), and clearly accelerating inflationary pressures also led to worries about the adequate management of fiscal and monetary policies in the region. The oil shocks during the 70's were weathered in part because LAC's exports were helped by the increase in the prices of commodities (agricultural and non-agricultural), and because of the increased availability of financing in private world capital markets.

The radical change in world macroeconomic conditions after the second oil shock, found LAC countries very vulnerable, in good measure because of policies that had left the region with a comparatively small export base, very dependent on primary commodities, and a greatly expanded external debt. The policy debate regarding the proper development strategy during the 70's was submerged by the urgency to absorb the triple shock in declining terms of trade and export volumes and skyrocketing interest rates, which hit the region at the beginning of the 90's. Although the rigidities of the inward-oriented development strategy hampered the possibility of an easy adaptation to the new circumstances, the size of the shocks was such that a painful process of adjustment was unavoidable. Different calculations showed that the increase in interest payments and the decline in the terms of trade amounted to a negative shock of almost 4% of the LAC's GDP in 1982. And after the Mexican crisis in August 1982, external financing, that during 1980-1982 had been about 5% of the GDP, dropped to 1% in 1983 and became nil during 1984 and 1985 (see references in Diaz Bonilla E. 1991a).

The region suffered another trade shock in 1986, when commodity prices collapsed worldwide. Although interest rates declined in nominal terms, they stood high in real terms, particularly if

¹ This is based mainly in Diaz Bonilla 1991 a, and Rea and Diaz-Bonilla, 1997.

deflated by the prices of the region's exports. This new shock hit hard LAC countries, in many cases erasing the gains of the adjustment efforts of the first half of the decade.

The process of adjusting domestic absorption and the current account to the reduced international funding and value of exports, fell comparatively more on investments and imports, which affected the rate of growth of the economies. At the same time, money financing of the reduced but still high fiscal deficits led to higher and more variable rates of inflation in the region. Inflation moved from an annual average of approximately 45% (consumer prices) during the 70's to almost 190% per year during the 80's. The unstable macroeconomic framework affected both private investment and the banking sectors, further depressing economic activity. While from WWII to the end of the 70's the region grew at an average of 5-6% per annum, the growth rate declined dramatically to an annual average of 1% during the 80's (and it was negative between 1981 and 1984). These growth rates were below population growth, and therefore income per capita declined during the 1980's.

By the end of the decade, the strong adjustment effort, helped since 1989 by the implementation of the Brady Plan, led to better external indicators for several LAC countries, but internal economic and social indicators still reflected the difficulties of the decade. Prices of LAC's export commodities continued to be soft. At the policy level, governments in the region continued with the process of fiscal consolidation, at the same time that domestic markets and international trade were progressively liberalized.

Following the deceleration of the world growth at the beginning of the 90's, macroeconomic conditions changed once again, when the Federal Reserve shifted to an expansionary monetary policy to try to get the US economy out of the 1990-1991 recession. This coupled with an improved policy environment in LAC led to an important surge in capital flows to the region from 1991 until the end of 1994. After a brief interval following the 1994 Mexican devaluation, capital continued to flow to the region, lifting the external constraints under which the region had been operating during the 80's and leading to the resumption of growth in the region to about 3.1% per year.

However, the recent financial crises in Asia, Russia and Brazil, have changed again the macroeconomic environment, and are negatively affecting the growth rate of the region in 1998 and 1999.

(b) The agricultural sector

The dynamics of the agricultural sector of LAC reflects both long-term trends as well as the impact of changes in domestic and international macroeconomic and sectoral conditions. Overall, the share of agriculture in total GDP in LAC has followed a well-known pattern: as income grows, the relative importance of agriculture has declined. In the period 1970-1995 agriculture in LAC grew at an annual rate of 2.7%, while regional GDP expanded at 3.3% per year. As a result, while agriculture contributed with 16% of total GDP in the region in the mid 60's, currently, the share of agriculture is about 10%. Yet, there is a broad range within the region: from 4% in Venezuela to around 10% in MERCOSUR and 16% in Central America.

There has also been a strong trend toward the concentration of economic activity in the large economies of the Region. The combined total output of Brazil, Mexico and Argentina grew from 62% of the regional GDP in the mid 60's to 80% in the mid 90's. At the same time there has been a concentration in agricultural value-added: while the three largest economies accounted for 58% of the value added in that sector in 1965, the corresponding figure for 1995 was 77%. Brazil, the largest economy in LAC contributed with one fifth of the regional agricultural GDP in the mid 60's, while the Brazilian share thirty years later was one third of the LAC's agricultural GDP.

The pattern of agricultural growth, however, has not been uniform during the last 25 years. After an initial drop, during the 70's there was a distinct acceleration in agricultural production in LAC (Chart 1): high world prices fueled the expansion of exportable and import-substitution agricultural products, while strong domestic demand sustained those products that (because trade restrictions or intrinsic characteristics) were non-traded goods and the expansion of the industry provided demand for agricultural raw materials. It is true that the economy grew faster than the agricultural sector during this period, but the sectoral growth was significant nonetheless, and stood above the GDP growth rates achieved in subsequent years.

It has been demonstrated that during this time the agricultural sector and rural areas were affected by a policy strategy biased toward the industrial sector and urban areas (see, for instance, Krueger et al, 1991). However, supportive world markets and domestic income growth, appear to have been enough to generate comparatively higher growth rates in the agricultural sector of LAC (Diaz Bonilla E. 1990).

During the 90's, as indicated, world and domestic conditions for the agricultural sector of LAC changed substantially. Devaluations of the exchange rates and the progressive advance of trade liberalization removed at least part of the policy bias indicated. Real exchange rates (defined as the price of tradable over non tradeable) increased in many countries in the region, favoring export and import substitution agricultural productions. However, reductions in government expenditures in infrastructure and technology, as well as the elimination of marketing and price support programs that were benefitting specific crop and livestock production in several countries, tended to affect supply negatively. Also the higher cost of imported inputs (as a result of the devaluations), and the reduction of credit to agriculture by the public and private banking sectors (partially linked to macroeconomic stabilization programs), had a negative impact on agricultural production. The slow down in domestic demand affected livestock and dairy productions, which have an important component of domestic consumption, the crisis of the industrial sector carried over to some agricultural raw materials, and the weakness in world markets hit hard exportable agricultural goods and made difficult for LAC governments to continue the support of some import-substitution products, such as wheat (Diaz Bonilla, 1990).

As a result of this combination of positive and negative circumstances, agriculture held better than the rest of the economy during the harsh decade of the 80's and continued to grow, even above the average for the economy and far more than the industrial sector. In consequence, over time, agriculture has shown a much steadier path than either the manufacture sector or the whole economy. The variability of the agricultural growth rate has been about one third than that of the whole economy.

The positive impact of the remotion of the policy bias against agriculture (through devaluation of the exchange rate and trade liberalization) was in good measure offset by several factors such as the decline in world prices (in the case of tradeable goods); the slowing down of domestic demand (which affected livestock and dairy production); problems of the industrial sector (which reduced demand for agricultural raw materials); lack of infrastructure and credit, higher prices of inputs and machinery, and, in the case of the non trivial segment of crops that received net support from LAC governments (in spite of the overall policy bias against agriculture), the termination of such programs under the pressure of fiscal constraints and lower world prices (Diaz Bonilla E. 1990).

In the 90's, however, after a slow start due to the continuation of low growth at the world level and in the region, LAC's agricultural production picked up again, at least until 1998. The full impact of the financial crises that begun in 1997 in Asia is still to be seen.

II. TRADE PERFORMANCE

During the 90's, a general process of trade liberalization took place in the region, as a result of different causes. One of them, has been the advance of regional trade integration, which included the creation of new trade agreements (such as NAFTA and MERCOSUR), the revitalization of older ones (such as the Central America Common Market, the Andean Pact and the CARICOM) and the proliferation of smaller trade pacts (such as G-3, and the active presence of Chile in the signing of bilateral agreements). Moreover, several countries in Latin America liberalized their trade regimes in the last decade either because they joined the GATT (Mexico in 1986 and Venezuela in 1990), or because they unilaterally pursued policies of greater openness (like Chile and, more recently, Colombia, although in the latter case there has been some reversal of policies).

This has changed the policy environment.

In some products, the combination of trade liberalization, some appreciation of the exchange rate (linked to larger capital flows), low world prices and the termination of internal support due to fiscal constraints have led to larger imports. But the restructuring of the agricultural sector is also generating larger exports.

Historically, LAC has had a positive net agricultural trade balance, which in 1996 amounted to about 20.2 billion dollars in current terms (see Chart 2). However, the ratio between the value of agricultural exports and imports has fallen significantly from about 3-3.5 in the 60's to around 1.70 in the 90's.

The overall positive trade balance masks wide differences in the region. Looking at the agricultural export/import ratio in individual countries, important differences exist: from Argentina and Costa Rica, which have ratios of more than 8.5 and 5.5, respectively, to Haiti, Peru, Bahamas and Venezuela, with ratios of 0.3 or less.

In terms of individual products, one of the most important developments of LAC agriculture in the recent past has been the emergence of fruits and vegetables as the leading agricultural export

of the region (in value terms), displacing traditional commodities. Along with the growth of the oilseeds complex, both groups account for an important part of the increase in production and the continuation of a surplus in net agricultural trade. On the other hand, traditional exports such as coffee and sugar have decreased in importance.

The region has been usually a net importer of cereals and dairy products, and the gap appears to have increased lately. This seems related more to increases in consumption than declines in production, which, for the region as a whole, has accelerated in recent times compared to the 1980's (although there have been declines in production in some countries). The resumption of economic growth, lower world prices, the opening up of the economies and the surge in capital inflows leading to some appreciation in exchange rates in the region have been pushing imports up since the late eighties.

An important characteristic of agricultural trade (and, in fact, of all international trade) in the region, is the steady increase in the share of intraregional commerce, which, for the Americas (including USA and Canada), moved from 1/4 of total agricultural exports in 1981-1983, to more than 1/3 by mid-1990's. Among LAC countries Brazil is the less dependent on the region for its agricultural exports and imports, while Mexico appears on the other extreme of the spectrum. Other countries with greater diversification in the destination of exports and the source of imports of agricultural products and food are Argentina, Chile, Peru and, to a lesser extent Uruguay and Colombia.

Regional pacts have had an impact on the trade flows of their respective members. Clear cases are Mexico with regard to NAFTA and Uruguay, Paraguay and (to a lesser extent) Argentina with respect to MERCOSUR. But, for obvious reasons, NAFTA also has a strong presence in the trade flows of nonmembers countries in the region, including Brazil (for whom in terms of agricultural and food exports, NAFTA is more important than MERCOSUR).

All in all, the process of trade liberalization that has taken place in the region and the implementation of trade agreements have fostered agricultural trade. This has led to larger coefficients of internationalization, measured as exports over production and imports over consumption, for a variety of agricultural products, indicating a larger exposure of LAC's agricultural sector to world markets (Chart 3 shows aggregate values).

The evolution of trade flows will depend, inter alia, on trade and agricultural policies in the Americas and elsewhere, which, in turn will be influenced by different multilateral, regional and bilateral agreements that will result from the complex negotiations ahead. These negotiations include the continuation of the process initiated during the Uruguay Round of GATT, and, for the countries of the region, the possibility of creating a Free Trade Area of the Americas, as well as extraregional negotiations such as the participation of NAFTA countries and Chile within APEC, and the discussions between MERCOSUR and the European Union. The next section presents a brief review of possible trade agricultural issues in those negotiations.

III. TRADE POLICY ISSUES IN THE REGION

1. Exports subsidies, dumping and related issues.

For the agricultural sector of LAC countries in general, one key issue would be the elimination of export subsidies. As part of the negotiations of a Free Trade Area of the Americas, the idea of declaring the American Continent as a subsidy-free region has been discussed. In the coming WTO negotiations LAC countries will certainly push for the elimination worldwide of exports subsidies in agricultural goods. The subject of state trading enterprises (with the possibility of increasing disciplines and transparency on practices that may operate as subsidies or dumping on the export side, or hidden trade barriers, on the import side) will also be of interest of LAC countries, along with the proper administration of current remedies, such as countervailing duties and antidumping measures (although this last issue is a broader subject that goes beyond agriculture). Finally, different LAC countries have been urging the integration within a unified framework of the three groups of disciplines related to export subsidies, export credits and food aid, to avoid loopholes and "grey-areas".

2. Market Access

The patterns of trade and market access in different countries in the continent will be influenced by the complex system of border measures resulting from the implementation of the Uruguay Round, NAFTA, and MERCOSUR and the revitalization of Central American Common Market the Andean Pact and CARICOM, as well as by the potential agreements between countries in the region and extra regional partners (the UE and APEC for example). The analysis of different scenarios will require the utilization of general equilibrium models of international trade, to disentangle the possible effects. IFPRI, along with other institutions is very active in the implementation of empirical models for trade policy analysis.

Opportunities for expanded market access will depend on increasing the volume of imports allowed under the current regime of tariff-rate quotas; on further reduction of tariffs, particularly those still very high in some key products, such as fruits and vegetables, sugar, meat and dairy products, among others; and on completing the process of tariffication in the cases where exemptions were granted. Also, the elimination, or at least the reduction, of tariff escalation is an important subject for less developed countries, to the extent that this practice undermines their possibilities of generating local employment and increasing the value added of their products.

The traditional subject of the administration of safeguards will also be part of the discussion, along with issues such as price bands, rules of origin, technical standards, customs procedures and classification of goods, measures taken at the sub-national (provincial) level, and, in general, administrative procedures of the different agencies that may have a participation in the regulatory or operational aspects of import/export activities.

3. Domestic support

The final agreement on domestic support reached at the Uruguay Round did not impose the disciplines initially envisaged in the Dunkel Proposal of the Draft Final Act, particularly because

the measure of support was transformed from a product-based one to an aggregate value for the whole agricultural sector, and the main domestic subsidies of the US and the European Union were kept outside the disciplines in what was called the "blue box".

LAC countries, which for reasons mainly related to fiscal constraints, have dismantled or significantly reduced their own domestic support for agricultural producers, will probably push for further disciplines in this regard, particularly the tightening of the criteria for the green box, the definition of the measure of support by product and the elimination of the exemptions considered under the blue box. With the changes in the 1996 Farm Bill in the US, currently only the European Union's domestic subsidies are in the blue box. However, if low world prices persist, and with a far stronger fiscal position in the US, pressures to revert to the old system will mount in this country. Therefore, LAC countries, specially net exporters, will try to maintain on the table the issue of further disciplines on trade-distorting domestic subsidies.

4. Sanitary and Phytosanitary Issues

The regulatory frameworks for development, adoption and implementation of measures to protect human, animal and vegetal health from risks caused by animal or vegetal diseases, foods, additives or contaminants, constitute an important area within the agricultural negotiations of the Uruguay Round.

The regional experience in the context of expanded agricultural and food trade shows the increasing importance of sanitary and phytosanitary (SPS) issues in trade disputes. Here, a key issue will be to discern between legitimate differences in the interpretation of scientific evidence from the protectionist uses of SPS measures. Rather than reopening the SPS agreement, many LAC countries will probably prefer to allow the process of dispute settlement to clarify the issues involved.

5. Other Trade-related Issues

For LAC and the Americas, in general, an important issue is the interaction between the different levels of trade negotiations: the WTO process beginning in 1999, with the trade talks regarding a Free Trade Area of the Americas (where an Agricultural Committee has been recently created) and the continuation of the subregional agreements in the American continent.

Although LAC is a net agricultural exporter and several of the larger producing countries are part of the Cairns Group (Argentina, Brazil, Colombia, Chile, Paraguay and Uruguay), there are several net agricultural importers in the region (Mexico, Peru, Venezuela, Haiti, Dominican Republic, Surinam, Trinidad-Tobago and Barbados). These countries will be concerned about export taxes, export prohibitions and other measures that may hamper their access to food supply at adequate prices, and which may increase volatility in world markets. Also they will carefully consider the impact of trade negotiations on their food bill, in terms of the total cost and volatility.

Genetically modified agricultural products present a special challenge on several dimensions, including the implications for the WTO intellectual property rights framework, and the proper

administration of the agreement on technical barriers to trade (for example, the issue of labelling in some importing countries).

Finally the debates over the links between trade, labor and environment, will require an important analytical effort in the LAC region, to try to separate legitimate concerns from the utilization of those issues for protectionist purposes.

6. Social concerns

The impact of the trade and agricultural policy changes on poor consumers, on the demand side, and small producers and minifundistas, on the production side is a matter of debate in LAC. Concerns have been voiced about trade liberalization leading to greater food price instability that may hurt the poor, and displacement of small domestic producers by cheap food imports.

On the other hand, greater productivity and growth coming from better trade and sectoral policies should help the employment conditions and income generation process in LAC countries, benefitting the poor, given an adequate operation of markets and social institutions. The growth of exports of the fruit and vegetable complex, with its labor-intensive structure, is an example of LAC countries following their comparative advantages, which requires to keep adequate access to the developed countries' markets. Additionally, the Uruguay Round has begun to discipline the unfair competition of subsidized and dumped exports, while at the same time allowing developing countries to maintain stocks for food security purposes, the provision of domestic food aid for population in need, and the implementation of decoupled systems of farm support (such as Procampo in Mexico).

The issue here is the adequate design of domestic policies to achieve the intended objectives of price stability and poverty alleviation, which most certainly will not be helped by trade distorting interventions.

LAC countries as a whole, exporters and importers, should also be interested in the adequate funding of food aid (including special funds for emergencies), within an integrated framework of disciplines that considers the continuum from food aid to commercial credits.

7. The Political Economy of the Negotiations

A key question relates to the political economy of the negotiations: the incentives and disincentives for the different countries to participate in the negotiations. LAC is a vast region, with exporters of agricultural products from temperate climates, exporters of subtropical and tropical goods, and net food importers. Some of them may worry about domestic and export subsidies in cereals, oilseeds and meat; others may be concerned about quotas, tariffs and the application of SPS measures in fruits and vegetables; others yet may be troubled by high barriers in tropical products like sugar and tariff escalation in many products, that may enter at low tariffs only if not processed; and, as indicated, countries with trade deficits in agricultural products will be concerned that trade negotiations do not increase their import bill.

At the world level, the alignment of issues is also very different from the Uruguay Round. Then agriculture was part of a larger negotiation, giving more leverage to those countries interested in an agricultural deal which could block the rest of the package; US and Europe were under pressure to reduce the fiscal cost of agricultural support; world agricultural markets were badly distorted and the subsidy war between these two major exporters was very expensive and was depressing world agricultural prices.

Now the fiscal position has improved significantly in USA and the European Union has also reduced fiscal deficits; the Uruguay Round helped to reduce some of the distortions of the world agricultural markets, and past subsidy wars seem to have decreased in intensity. Also, except that the multisectoral Millennium Round takes off, the continuation of the negotiations in agriculture may be conducted separate from other issues. This would reduce the leverage of countries interested in further reforms. Even for the developed countries with a highly protected agriculture which may want to reduce such protection, a stand-alone negotiation makes it more difficult to balance the interests of different domestic groups.

The political economy of the trade negotiations, as well as the quantitative estimation of different scenarios for those negotiations, are important issues that will have to be considered by LAC countries to develop their own negotiating positions.

8. Macroeconomic issues, capital markets, and economic instability.

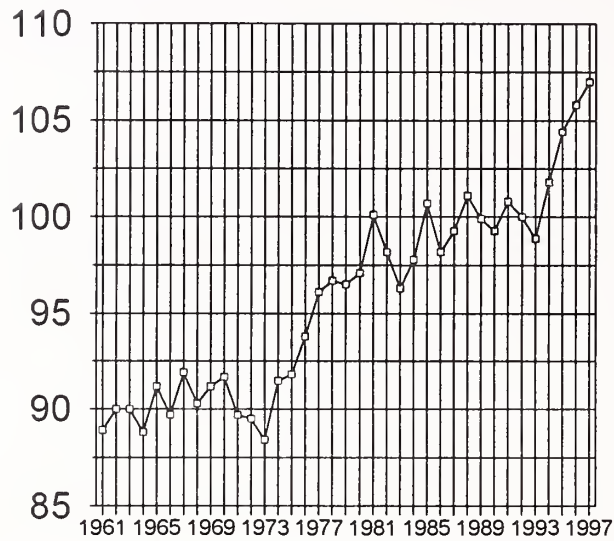
The importance of macroeconomic policies for the agricultural sector is widely recognized. Particular emphasis has been placed on the impact of the exchange rate policy on agriculture, but, in fact, is the whole macroeconomic program which is relevant, including monetary and fiscal policies (Díaz-Bonilla and Robinson, 1997).

Moreover, in a world with increasingly larger financial markets, the dynamics of trade flows, contrary to past history, appears to be dominated by capital flows. Therefore, coordination of macroeconomic policies may be more important for commercial flows, including agricultural products, than trade negotiations.

The developments in capital markets may also affect price stability, including for agricultural products. While expanded trade should reduce world price volatility (to the extent that supply and demand conditions are averaged over a larger set of countries, and economic and weather circumstances), if capital flows have become more volatile, then world prices will also show greater variability. But this would not result from expanded trade in agricultural products, which in fact may have contributed to reduce volatility. Regarding price stability, the challenge, at the level of the agricultural sector, may well be the need to devise market-based schemes of income stabilization, utilizing the far larger pool of financial resources and instruments in capital markets.

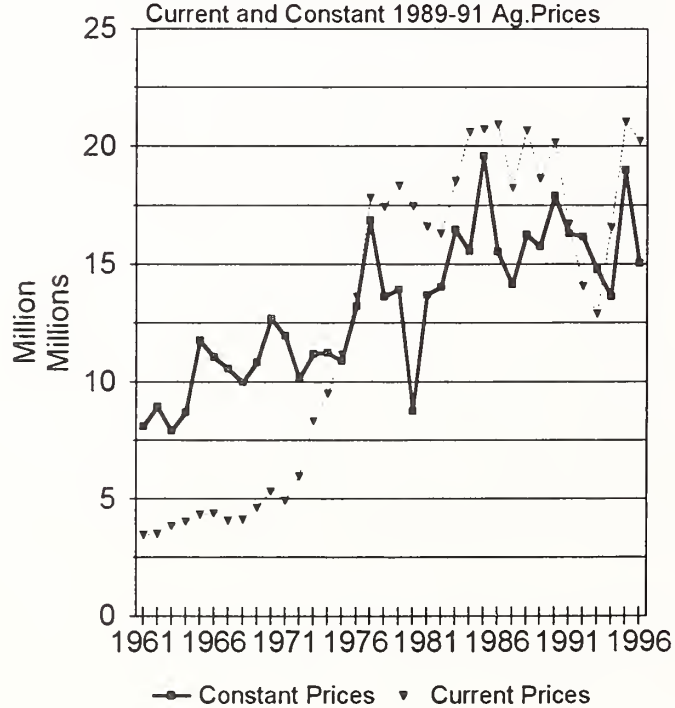
LAC Total Agricultural Production

(FAO; Indices 1989-1991=100)



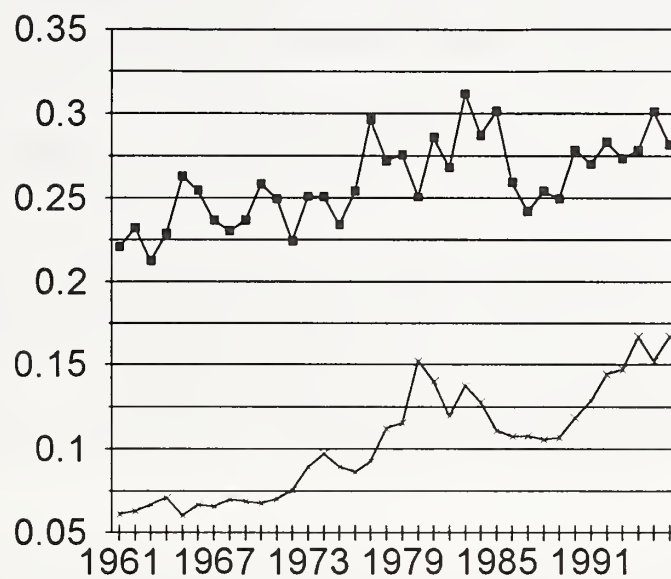
LAC: Net Trade (Billion US\$)

Current and Constant 1989-91 Ag. Prices



Total Agricultural Production

Exports and Imports as % Total Prod.



AG OUTLOOK 1999

Thomas K. Schwartz
Executive Vice President, Beet Sugar Development Foundation

Good morning ladies and gentlemen. First of all, I would like to thank John Love for asking me to be here with you today. I hope that my presentation will give you some insight into the advancing technologies in sugar crop production. Although I will be speaking on both sugar beet and sugar cane, I must preface my remarks by telling you that I am no expert in sugar cane production. Even though, sugar beet and sugar cane are very different crops, as you will see, through my presentation, the advancing technologies are similar, as are they in most agronomic crops.

To begin with a bit of background. In 1998, Sugar Beets were grown in 14 states, on 1, 430,000 acres and will produce about 4.4 million tons of sugar. Sugar Cane was grown in 4 states plus Puerto Rico on 877,000 acres for an estimated production of 3.3 million tons. Sugar Cane was introduced to the Americas by Columbus, and Sugar Beet production came much later, around 1836.

When we look at the technology of sugar beet and sugar cane production, it can most easily be broken down by what I will refer to as Agronomic Factors, I have them listed here. Biology and Physiology, in essence the basics. Genetics and Breeding, as it relates to and interacts with crop growth. Soil Management and Crop Establishment, the interaction of the crop with the environment. Nutrition, primarily the fertilization of the crop. Diseases, Insects, in which I include Nematodes and Weeds, as these are the major pests of the crop, and finally, Harvest and Quality factors, which ultimately effect the processability of both cane and beet. I would like to discuss each of these separately, however, you will see that they all interact.

Biology and Physiology

The biology and physiology of the crop is the basis for all the other sciences names. It is what forms the relationships between the various components of crop growth and production. This is long term/high risk research, but is essential knowledge to be able to proceed in advancing the more applied technologies. There have been rapid advancements in instrumentation and availability of tools used in physiological research. An example is automated measurements of physiological properties in the field, such as photosynthesis or leaf area index. Chemical instrumentation has advanced also, especially in the areas of Chromatography and Spectroscopy, making it possible to determine many physiological characteristics more rapidly and precisely.

Genetics and Breeding

Traditional breeding programs in both sugar beet and sugar cane have been very successful. Major milestones that can be cited include the discovery of monogerm seed in sugar beet, major advancements in disease resistance in both sugar beet and sugar cane, and a steady

increase in yield and sucrose content. However, it is felt, given the limited gene pool within these species, that we may be near the upper limits of what can be obtained with only traditional breeding programs. Genetic engineering, through biotechnology, is our next major stepping stone. The technology in this area is, as you know, advancing more rapidly than can be reported on. There are three major areas in this program. Isolation of the needed gene, insertion of that gene, and regeneration of the plant material. As I speak later of the various pest problems and yield and quality parameters, the isolation of the needed genes will be addressed. The techniques for the insertion of a desired gene include such things as bombardment guns, which use DNA-coated gold particles and the use of biological vectors, such as *Agrobacterium*. Sugar beet is more difficult to transform and to regenerate than many other crops. However, advances are being made in tissue culture techniques that are speeding up this part of the process. This whole process is not as simplistic as I have outlined. Even after the desired gene is located, inserted, and the material regenerated, the genetic engineer and the traditional breeder must work together to incorporate this into existing breeding lines, while maintaining the original traits and the new trait or traits which came from the genetic engineering process. In line with this, significant efforts are being made in gene mapping to identify important genes. Areas of most promise in the near future are herbicide resistance, disease resistance, and yield and sucrose content.

Soil Management and Crop Establishment

As with most agricultural crops, the traditional practices of deep plowing and heavy disking are going away. We are also moving away from flat planting in sugar beets, a practice which lent itself to severe erosion by both water and wind. New equipment is being developed for incorporation of minimum or reduced tillage operations. Along with this, planters are being developed, which do an excellent job of planting into this type of field preparation, while still allowing for good germination and crop establishment. The practice of planting on formed beds has also aided in reducing the erosion problems.

Nutrition

Crop fertilization is very important in sugar beet production. As in most crops, the primary fertilizer applied is some form of nitrogen. For many years, fertilization was done on a broadcast basis, utilizing recommended rates for the crop and the yield expected. Often this led to over-fertilization. Not only is over-fertilization costly, but it can create environmental problems. The use of soil analysis and petiole analysis have taken us a long way toward the more accurate and discriminate use of chemical fertilizers. Now we are entering a new era, using satellite imaging and global positioning to determine the needed fertilizer, and to apply that fertilizer more accurately.

Diseases

Diseases account for the greatest losses in both sugar beets and sugar cane. The traditional methods of disease control, namely varietal resistance, crop rotation, cultural practices, and fungicides, have been utilized for a number of years. However, due to agronomic and economic restriction, and resistance to some fungicides, in recent years, the diseases seem to have been winning the war. As an example, the states of North Dakota and Minnesota alone estimate they lost 70 million dollars in 1998 to one disease, caused by the fungus *Cercospora*. We are confident that the future advances in the area of disease control will lie in Genetic Engineering, as I mentioned earlier in my talk.

Insects

There are several major insect pest of sugarbeets. These can cause damage either directly or indirectly, by transmitting diseases. The traditional means for control of insects are similar to those mentioned for control of diseases: chemical insecticides, cultural practices and crop rotation. These have worked well in the past, but again similar to the disease situation, there are environmental concerns and an increase in resistance. Biological control of insects has been a growing science for years, however, it has not been effective in controlling sugar beet insects. Recent developments in technology have taken us one step further than that. Examples include the use of trap crops for the control of the sugar beet cyst nematode. This technology incorporates the use of either a special type of radish or mustard crop, preceding the sugar beet crop, which in essence disrupts the life cycle of the nematode, causing a dramatic reduction in population. This practice does not work in all places where nematodes are a problem, but it is effective in many areas. Another good example is the recent discovery of a fungal pathogen, that is very effective in attacking and controlling the sugar beet root maggot. The areas of biological control, natural predators and ultimately genetic engineering will be the future of developments in insect control.

Weeds

For many years, the only means of weed control were hand labor and cultivation. Then came the era of herbicides, both pre- and post-emergence, where we were able to virtually eliminate hand labor. This has been effective, but again has been expensive and has raised environmental questions. The two up and coming areas of advancement in weed control still utilize herbicides, however in very different ways. The first lies in the development of equipment to apply very low volumes and low rates of herbicides, referred to as micro rates. This is certainly a more environmentally friendly means of herbicide application and has been shown to be very effective. The second is the one which I am sure most of you are familiar with. This is the use of genetic herbicide resistance or tolerance. This advancement through bioengineering and transgenics is now a reality. In sugar beet, we have varieties ready to go to the commercial fields which are resistant to two of the broad spectrum herbicides, Roundup and Liberty. We are currently awaiting EPA approval for the use of these herbicides on sugarbeets. Due to this fact, I would expect to see the first commercial production of transgenic herbicide resistant sugar beet in the 2000 growing season. Development of herbicide resistant sugar cane is also very near and should be commercial in the next few years.

Harvests and Quality

Definitely the goal in harvesting is to deliver the best possible raw material to the sugar beet factory or sugar cane mill. This not only means a high yielding crop, which is also high in sucrose content, but one which is low in impurities and in good physical condition. Through traditional breeding programs and fertilizer management, we have continued to make advances in yield, both tonnage and sucrose content, and a reduction in impurities, especially nitrogen containing compounds, which can cause difficulties in processing. The industry continues to develop new harvest equipment which is gentler on the crop, therefore allowing us to deliver a better quality raw material to the factories and mills. However, again, as I mentioned when I was speaking on Genetics and Breeding, we feel that we may be reaching a plateau with our existing gene pool and traditional method. Again, steps in biotechnology will be combined with the basic science of physiology. If through genetic engineering we are able to express the desired genes, it may be possible to go beyond our current yield plateaus in tonnage and sucrose content, and possibly to alter the levels of non-sucrose components in the sugar crop. Even further than that,

we may be able to change the form of sugar that the plant produces and stores. Two examples of this include the recent discovery and description of a super active form of the sucrose transporter and the discovery of a non sugar beet gene, which when inserted into a sugar beet causes the sugar beet to store fructans, rather than sucrose.

Now that I have outlined where our traditional technology is going, the question is where are these advances coming from. The answer is many places. The research and advancements I have mentioned are coming both from the Public and the Private sectors. In the Public Sector, both the United States Department of Agriculture/Agricultural Research Service and the State Land Grant Colleges are very active. In both sugar beet and sugar cane, the USDA/ARS is involved in the more basic research and the Land Grant Colleges are working to develop the more applied research. In the Private Sector, the research and developments are spread across Research Institutes, Seed Companies, Agro-chemical Companies and yes, the Sugar Companies themselves.

The structure of the sugar industry is changing rapidly. Not too many years ago, in the US, our sugar companies were totally domestic, and either cane or beet. Now we have more companies which are involved in both beet and cane sugar operations, some of these companies being multinational. The seed industry has moved from smaller domestic companies, to larger international companies, as has the agro-chemical companies. This movement has certainly had a positive effect on the development of new technologies in the area of sugar crops.

Another area which has stimulated the advancements in technology of sugar crop production is the global interaction of the people involved. On a national basis, we have such organizations as the American Society of Sugar Beet Technologists (ASSBT) and the American Society of Sugar Cane Technologists (ASSCT). Both of these groups promote the interaction of technologists and the exchange of information in their respective fields. Internationally, we have the International Society of Sugar Cane Technologists (ISSCT) and the International Institute for Beet Research (IIRB). Here also, the interaction and exchange of information has aided in the development of new technologies.

In conclusion, over the long history of sugar crop production in the US, we have come along way in the area of production technology. However, we feel that we still have along way to go. Especially with the increased development of biotechnology, advancements in the near and long term are plentiful. The sugar industry, through its partnerships with public and private institutions, will continue to strive to develop the needed technologies to advance our industry in the years ahead.

Economic Aspects of GM Beet and Cane

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Agricultural Outlook Forum 1999

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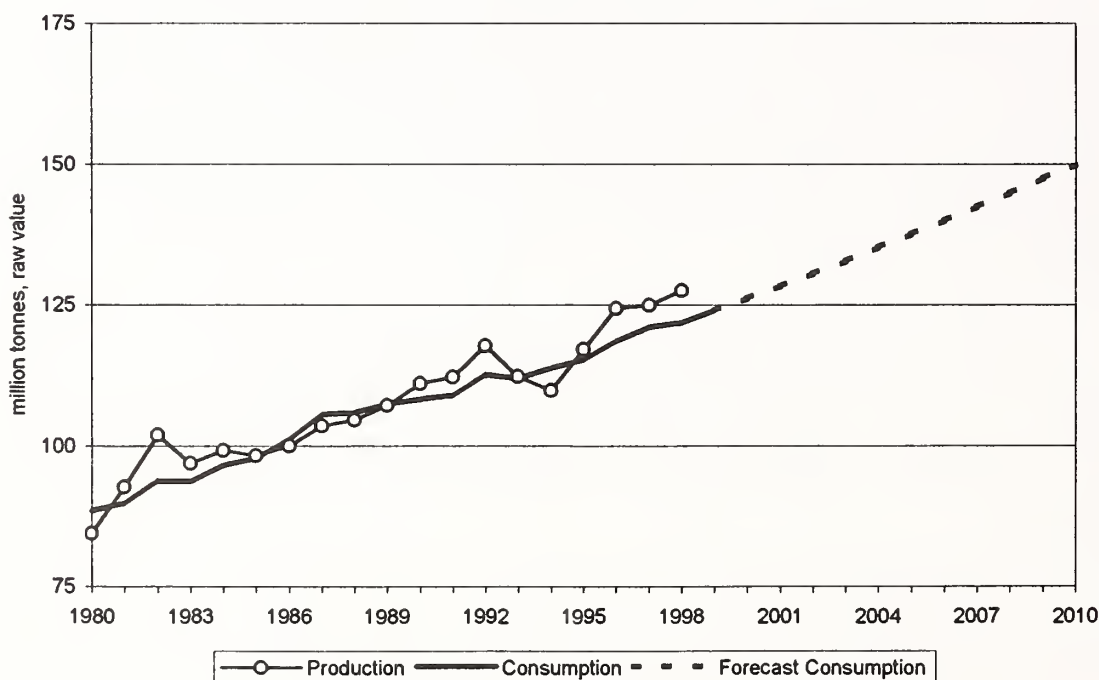
THE GLOBAL CONTEXT

Biotechnology has been hailed as a means to create a second Green Revolution in agriculture. In the case of sugar, I would like to begin by examining the challenges that the future holds for the world's cane and beet sugar industries, to assess the extent to which such a revolution is required.

At present, cane sugar accounts for around 70% of global sugar production, with beet sugar accounting for 30% of global output. On average, global sugar production and consumption have risen at an annual rate of 1.7% since 1980.

If we project this rate of growth into the future, the implication is that by 2010, a mere 11 years away, global consumption will have risen from its present level of around 124 million tonnes, raw value (Diagram 1).

Diagram 1: Trend in World Production and Consumption



Where is this extra 25 million tonnes of sugar, equivalent to an increase of 20% in global output

If we examine the way in which the world's beet and cane sectors have expanded output since 1980, a stark difference emerges: the driving force behind the expansion of world from today's level, going to come from?

cane sugar production since 1980 has been increases in cane area. By contrast, the key influence on the more modest expansion of world beet sugar production over the same period has been sugar yield.

Table 1 indicates that, on average, world beet sugar production has risen by around 0.7% since 1980. However, this has only been achieved because while world beet area has declined over this period (largely as a result of the contraction of the beet sector in the Former Soviet Union) by around 0.8% a year, average beet sugar yields have risen at a rate of almost 1.5% a year.

In contrast, the 2.7% annual increase in cane sugar production has been the result of strong expansion of cane area, at around 2.0% a year, coupled with a relatively minor increase in cane sugar yields per hectare of around 0.7%

Table 1: Influences on the Growth of World Sugar Production since 1980

	Average Annual Growth in Sugar Production (%)	← Influences →		Dominant Influence
		Area (%)	Sugar Yields (%)	
Beet Sugar	0.69	(0.79)	1.48	Sugar Yields
Cane Sugar	2.71	2.00	0.71	Area

Given that cane currently accounts for 70% of global sugar output, the burden of satisfying increasing demand for sugar in the future will fall mostly on the cane sector. Unless the cane sector succeeds in raising cane yields at a greater rate than it has done so to date, the area of land under cane will have to continue to grow at a rapid pace in the future.

Similar projections can be made for a host of other food commodities. This implies that as the supply of available agricultural land dwindles, and more marginal land is put under the plough, there will be an increasing need to focus on raising crop yields. Many scientists believe that biotechnology will be a key factor in addressing this issue, through the development of plants with enhanced production traits and the creation of new plant varieties designed to thrive under specific agroclimatic conditions.

Along with this technical argument, there is a powerful economic rationale for the global sugar industry to take the potential of GM beet and cane seriously.

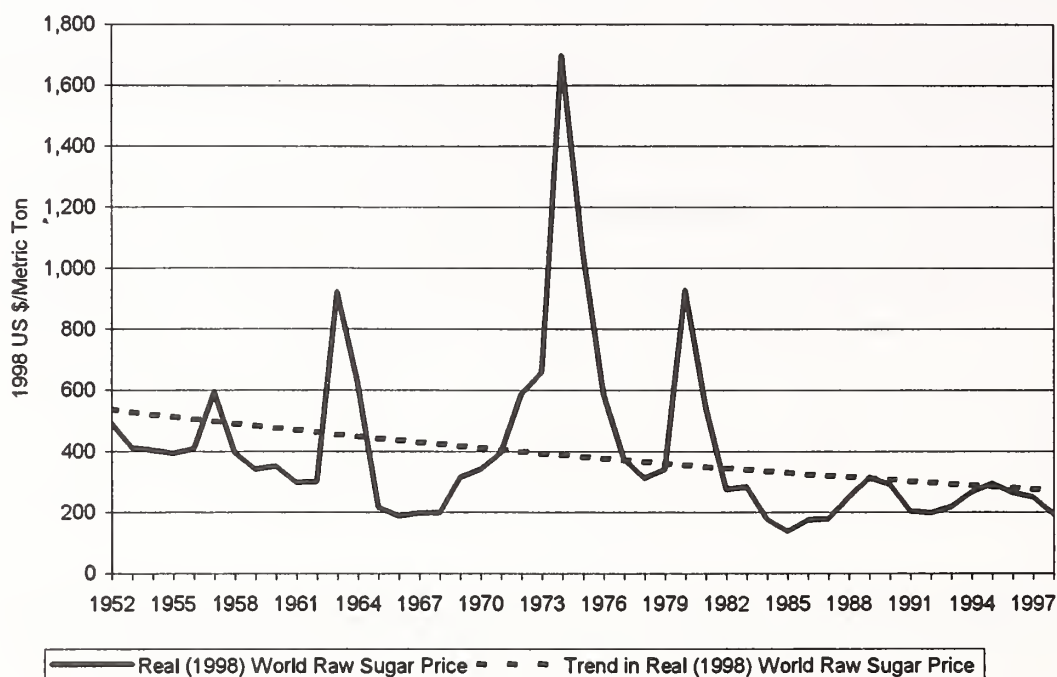
The slow but steady progress towards greater liberalisation of global trade in agricultural products suggests that any economic benefits to sugar producers arising from biotechnology will be seen as a means of enhancing competitiveness in the future. Diagram 2 indicates that over the last 40 years or so, real (i.e., adjusted for inflation) world sugar prices have fallen, on average, by between 1.5% and 2.0% per year. So far, global average sugar production costs have more or less managed to keep pace with this decline. However, what this implies is that producers are faced with a continual challenge of having

to lower their costs if they are to maintain, let alone improve, their competitive position in the international arena.

The constant pressure on producers to reduce costs creates a powerful economic incentive to exploit any cost savings that can be achieved through the use of GM crops.

Biotechnology is expected to make a significant contribution towards meeting the technical and economic challenges outlined here. What progress have the world's beet and cane industries made to date in developing GM crops?

Diagram 2: Trend in Real World Sugar Prices and Actual Real World Sugar Prices, 1952-1998



THE DEVELOPMENT OF GM BEET AND CANE

There is a fundamental difference in the breeding of beet and cane which has significant implications for the commercial development of GM beet and cane varieties.

Beet is an annual crop that must be grown every year from seed. Owing to the widespread use of hybrid seed, farmers cannot grow a crop of beet from seed collected from a previous crop; instead they must buy their seed from seed companies. As a result, a large and lucrative beet seed industry, with considerable resources to spend on research and development, has evolved to meet this need.

In contrast, cane is a perennial crop which farmers can propagate themselves without having to buy seed cane. So, not only do cane farmers replant their cane fields only once every few years, they also do not have to buy seed cane from cane breeders. The ability of farmers to propagate their own cane means that it has proved virtually impossible for any breeder to restrict the use of a newly developed variety to those farmers that buy seed cane directly from them. Not surprisingly, therefore, cane breeding programmes are

generally government or industry financed, and tend not to have access to research and development facilities on the scale available to beet breeders.

In the context of development of GM beet and cane, the nature of the plant breeding industries within each sector has meant that companies investing in the development of GM beet can see a ready mechanism for generating returns on their investment through annual purchases of seed by farmers.

However, the difficulty of monitoring the use of a GM variety of cane following its initial release (and hence the difficulty of collecting breeders' royalties or fees) represents a significant impediment to the commercial development of GM cane containing genetic material that is the intellectual property of a private company. Legislation in a number of countries is evolving to cope with intellectual property rights in the context of plant breeding, although not without controversy.

The majority of commercial GM crops are currently produced in North America. The spread of GM crops across the rest of the world is likely to be spearheaded by the adoption of the technology in large commercial operations producing commodity crops. This is because this type of industrial structure provides the best opportunity for recovery of breeders' fees. This in turn suggests that, where intellectual property rights are an issue, cane sugar industries in which ownership of cane is concentrated on estates or on large commercial farms are likely to be among the first to exploit GM cane. Among such industries are Australia, Brazil, Colombia and South Africa, all major exporters of sugar.

As a result of the nature of cane breeding and the problems it raises regarding intellectual property rights, it is generally agreed that the commercial use of GM cane remains two to three years away. In contrast, commercial uptake of GM beet is likely to take place within the next year in the US. What will the introduction of GM beet offer to growers, processors and consumers?

GM BEET IN THE US

Beet is an annual crop grown in rotation along with a number of other crops. Along with rotational constraints and the spreading of risk, the relative profitability of the range of crops available to a farmer is a key factor influencing the area of land a grower is willing to dedicate to beet.

The relative profitability of sugar crops compared to alternative crops therefore has a key influence on raw material supplies for sugar processors. This means that processors themselves maintain a keen interest in the relative profitability of sugar crops, since their own costs are intimately linked with the level of factory capacity utilisation. In the case of co-operatives, of course, beet growers and processors are one and the same.

In certain sectors of the US sugar industry, pressure on raw material supplies has been brought about by the competitiveness of alternative crops, notably in California and the Great Lakes region. In the Great Lakes, the profitability of soybeans and corn have often been higher than beet over the past decade, as Diagram 3 indicates.

With the advent of GM soybeans and GM corn into mainstream US agriculture, this competitive pressure is likely to intensify. Despite the additional cost of acquiring seeds, farmers using commercially available GM soybean and corn varieties have enjoyed

significant economic benefits, and the uptake of these varieties has been rapid (Diagram 4).

Diagram 3: Average Gross Margins (excluding Land Rent), Great Lakes Region, 1992/93-1996/97 (US\$ per acre)

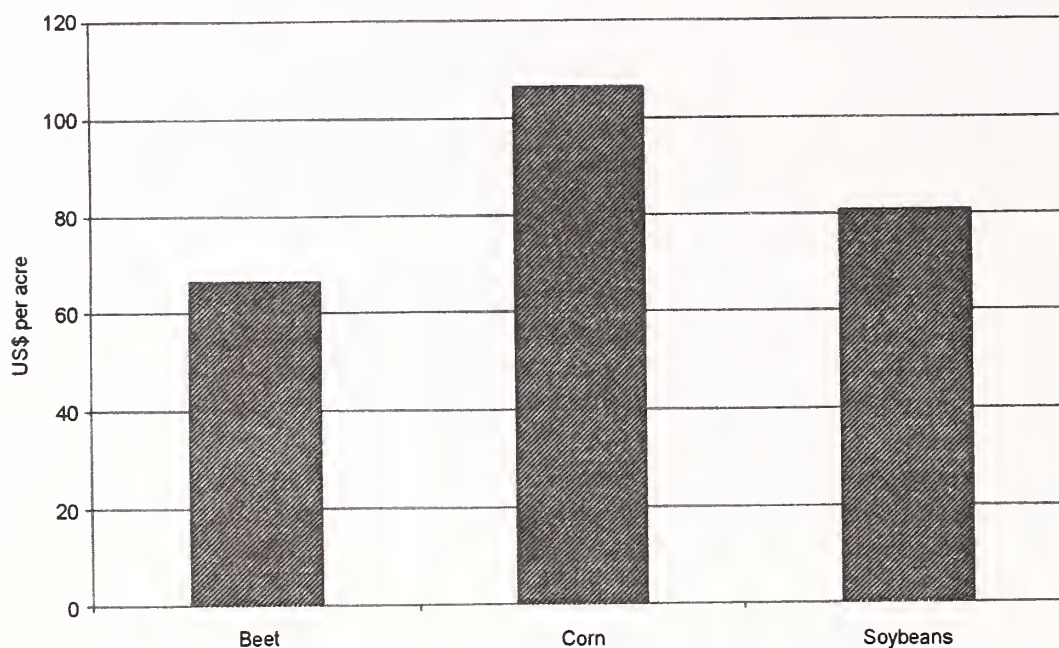
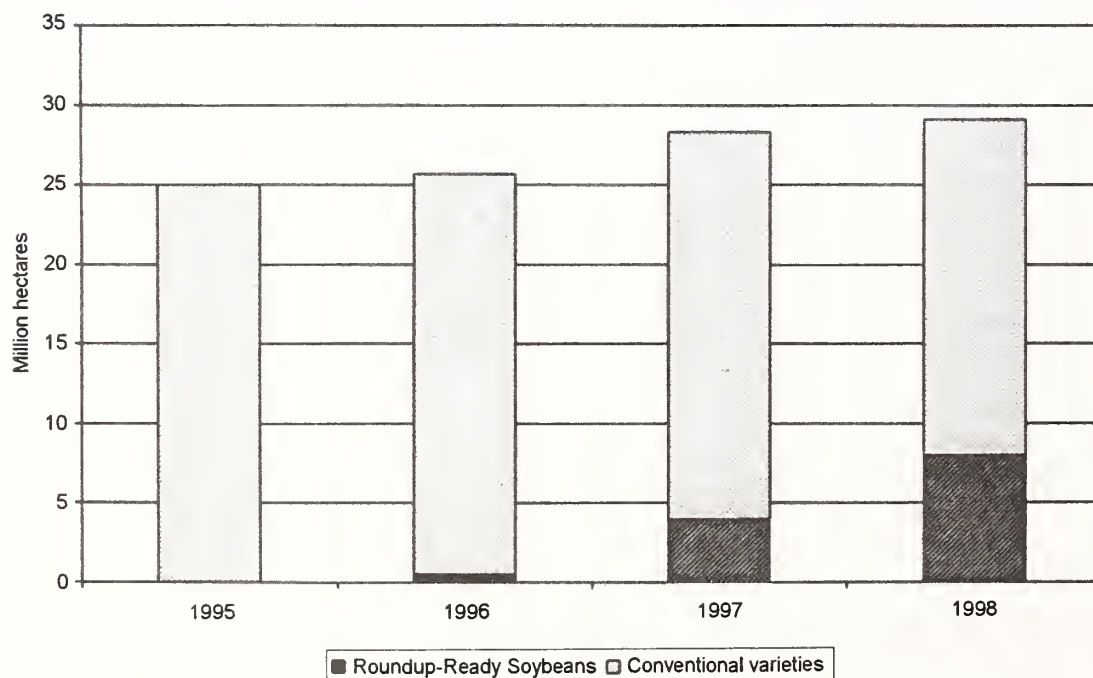


Diagram 4: Area Under Soybeans in the US, 1995 to 1998



It is likely that where such competitive pressures exist, the interest in GM beet will be greatest. Trials of herbicide-tolerant beet varieties in the US (and in Europe) have indicated that such varieties have the potential to reduce costs and to increase ease of management while matching or exceeding current average beet yields.

Under these circumstances, the herbicide-tolerant beet varieties that are likely to come onto the US market within the next 12 months are sure to be of interest to at least part of the US beet industry.

For growers, the economic benefits of GM beets are certainly compelling. But consumers' attitudes to the sugar produced from such crops is also crucial in determining the extent to which sugar processors and food industries will countenance the use of GM sugar crops, and this is the next issue I would like to address.

GM SUGAR IN THE US AND EUROPE

In the US, the FDA has officially approved the consumption of sugar and sugar by-products derived from GM beet. Because, in the US, the authorities have said that they see no evidence to suggest that, as a class, GM foods are inherently less safe than foods derived from conventionally bred crops, no special labelling is required for such sugar or for products containing such sugar.

To date there appears to have been little consumer resistance to this policy. Unlike their European counterparts, US consumers have been exposed to the GM debate for much of the 1990s, with the introduction of the Flavr-Savr tomato in 1992 and the approval of bovine somatotrophin in 1994. Furthermore, and this is a crucial point, US consumers have confidence in the FDA's judgement.

This stands in stark contrast to the situation in Europe, where the general public's confidence in the ability of scientists, regulators and politicians to monitor and assess potential threats to food safety has been undermined by a spate of recent food safety problems, most notably the BSE (Bovine Spongiform Encephalopathy) crisis.

This has meant that in Europe, consumers have yet to be fully convinced of the benefits of GM food crops. Given that the current 'first generation' of GM crops is geared towards enhancement of crop production, consumers can see no benefit for themselves in the introduction of such crops. Environmental concerns and worries about food safety have emerged as major issues affecting consumer attitudes to GM crops.

To date, only very small areas of GM crops have been produced in the EU, although considerable research into GM food crops has been carried out, as Table 2 indicates. The distribution of trials among EU countries broadly reflects national consumer attitudes to GM technology.

In the food processing and retail sectors, attitudes to GM crops are coloured by consumer opinion. For this reason, European sugar producers have for the most part adopted a position of neutrality towards GM beet.

However, it is possible that new labelling laws in the EU may encourage sugar processors to express greater interest in GM beet. Under these laws, all foods containing GM crops or their derivatives are required to be labelled, *except* when neither protein nor DNA resulting from the genetic modification is present.

For the EU sugar industry, this suggests that if GM beet were to be approved for use in the EU at some point in the future, the sugar produced from such beets would *not* have to be labelled as a GM food. The extraction and purification processes used in sugar production should ensure the purity of the final product.

Table 2: Notifications of Releases of Genetically Modified Crop Plants in the EU to July 1998

Country	Crop						Total
	Maize	Oilseed rape	Sunflower	Wheat	Sugarbeet	Others	
Austria	1					2	3
Belgium	14	38		1	8	29	90
Denmark		2			17	13	32
Finland		2			4	10	16
France	155	70	5		49	103	382
Germany	18	13			18	42	91
Greece	3					9	12
Ireland					4		4
Italy	77				19	105	201
Netherlands	13	9	2		16	60	100
Portugal	3					7	10
Spain	33	3	3	2	9	57	107
Sweden		14			4	18	36
UK	6	71		1	21	64	163
Total	323	222	10	4	169	519	1,247

Source: EU Commission.

Ultimately, however, the consumer is king. In Europe, environmental concerns about the commercial release of GM crops, coupled with an apparent desire on the part of the consumer for 'the right to choose' between the consumption of foods produced by conventional crops and by GM crops continue to dominate the public debate on the issue.

Indeed, the last two weeks have seen the GM debate plastered over the front pages of national newspapers in the UK. In the current rather frenzied atmosphere surrounding the issue, there is a real danger that a deluge of sensational headlines will deny the general public any significant exposure to reasoned arguments for and against the new technology.

GM SUGAR AND INTERNATIONAL TRADE

Of the 37 million tonnes or so of beet sugar produced every year around the world, only around 7 million tonnes enter international trade, and the vast bulk of this originates from the EU. The majority of beet sugar production is destined for domestic consumption, and thus the acceptability of sugar produced from GM beet is largely a domestic issue, as it is in the US.

The world's cane sector produces around 85 million tonnes of sugar a year, of which close to 30 million tonnes is exported. For those countries exporting to the EU (The African, Caribbean and Pacific group of sugar producers), the persistence of negative attitudes to sugar derived from GM crops might impede the uptake of such crops in these industries.

However, by the time these industries are in a position to export such sugar, attitudes in the EU may well have changed.

As mentioned earlier, the cane sugar industries having a structure most conducive to the commercial introduction of GM cane are those where cane production is concentrated on large mill-owned estates or private farms. Many of these industries are also significant exporters of sugar, such as Australia, Brazil, Colombia and South Africa. Given approval of GM cane in these countries, this could help to enhance their competitiveness relative to other exporters who may find adoption and regulation of the new technology more problematic.

Table 3: World Sugar Production and Trade ('000 tonnes, raw value)

	Average 1995/96 - 1997/98	
	Production	Exports
Beet Sugar	37,130	7,030
EU	17,770	5,250
US	3,730	-
Cane Sugar	86,220	27,470
US	3,260	-
Australia	5,550	4,490
Brazil	14,960	6,720
Cuba	4,010	3,130
Mexico	5,030	740
China	6,130	-
India	15,200	490
Thailand	5,580	3,780
World Sugar	123,350	34,500

CONCLUSIONS

It is clear that the technical and economic challenges facing sugar producers in the future provide a compelling argument for the adoption of GM technology for sugar crops.

Experience with commercial production of GM crops in the US suggests that the 'first generation' of such crops have considerable appeal to farmers. Particularly in those regions of the US where the margin of competitiveness of beet compared to alternative crops is narrow, there is likely to be considerable interest in herbicide tolerant beet.

While US authorities and consumers appear to be satisfied that their regulatory procedures adequately address environmental and food safety concerns, the introduction of GM crops and foods into the EU continues to be controversial. There is a real danger that current scare stories in the media could further damage EU consumers' perceptions of GM crops, which, at the very least, would be likely to result in significant delays in their commercial introduction.

As a substantial importer of cane sugar, the EU's stance towards sugar produced from GM crops could have a significant effect not only on the uptake of GM sugar crops within the EU (which represents a massive potential market for biotechnology companies), but also on their use in countries supplying the EU with cane sugar.

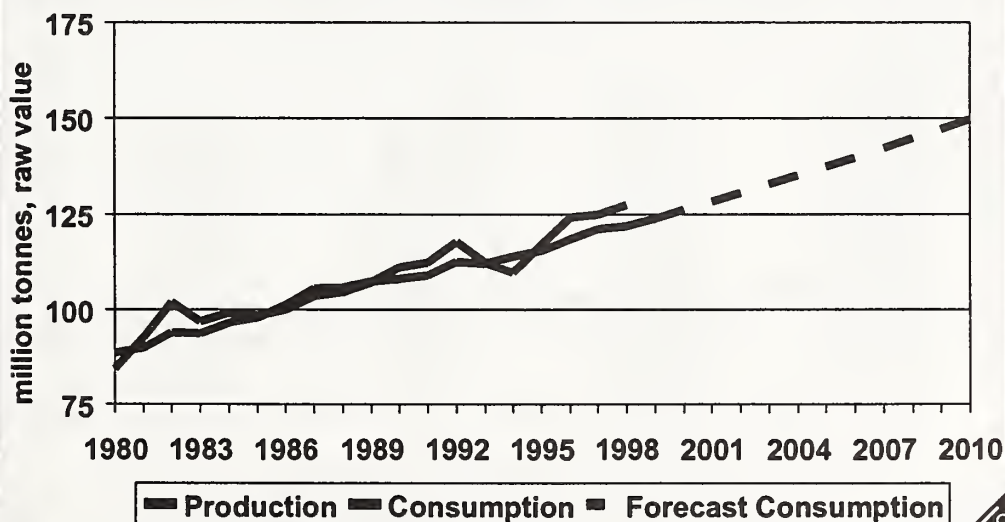
Economic Aspects of GM Beet and Cane

A Presentation to the
Agricultural Outlook Forum 1999

Andrew Duff
LMC International Ltd
23 February 1999

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Trend in World Production and Consumption



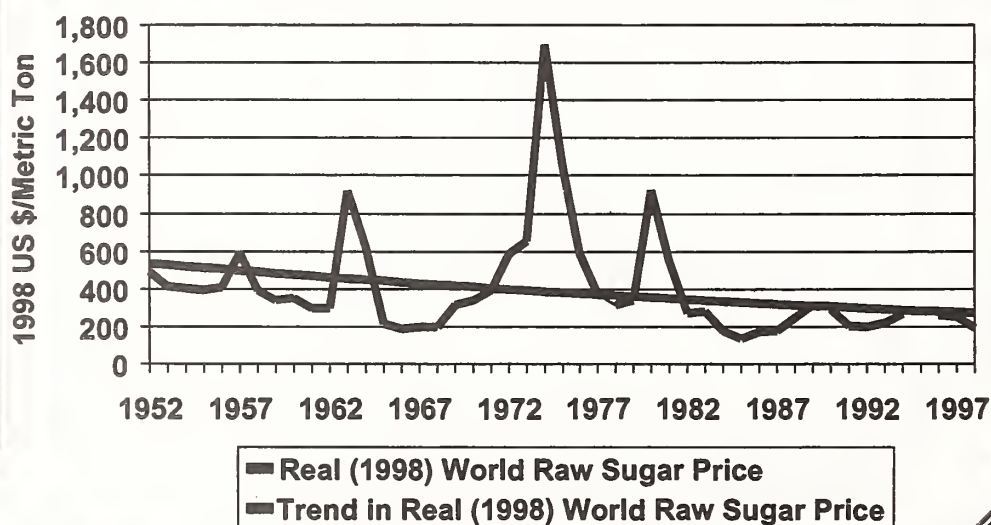
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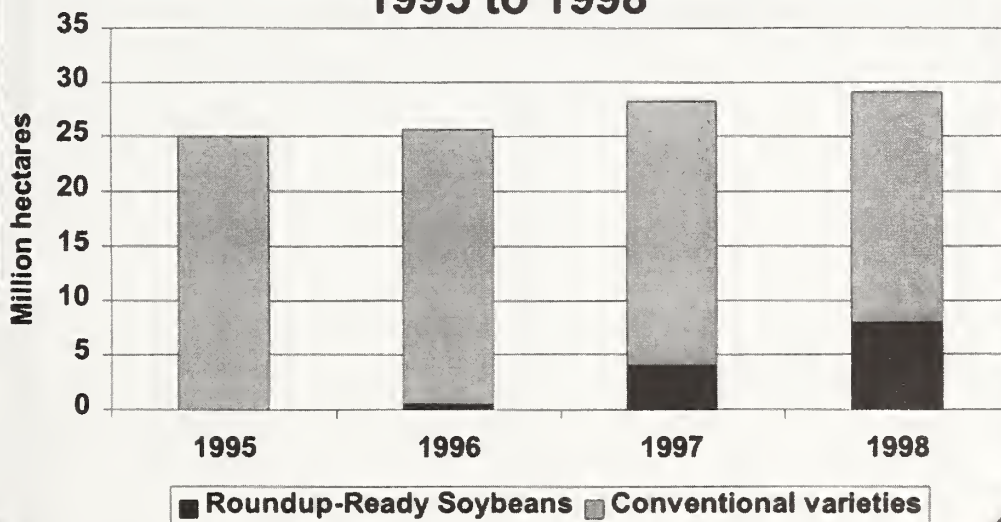
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OUTLOOK FOR EMERGING TECHNOLOGIES IN SUGAR PROCESSING

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ABSTRACT

Emerging technologies related to sugar factory operations are reviewed in the context of the potential impact of new factory technology. Increased productivity is the key goal and is a more complex issue than factory output alone. It is related to the efficient use of resources, including energy, equipment design and reliability and performance optimization. New technology is divided in this discussion into two types. Primary technology, which includes new equipment and operations, and secondary technology, which includes all knowledge and data based systems such as design, automation, performance evaluation and optimization. The potential of these technologies and their application to each stage of sugar production processes are outlined.

INTRODUCTION

The purpose of this paper is not to discuss new technology per se but to describe emerging technologies for the sugar industry that have the potential to improve productivity. The sugar industry has tended to operate in isolation from large-scale commodity producers and to think of itself as separate from the chemical processing industry (CPI). However, many of the unit operations are the same. As a commodity food product, there is only modest opportunity for product innovation but significant opportunities for process innovation, especially that related to improved productivity.

Some relevant comments from the CPI – J.A. Miller (Dupont) quoted in *Chemical and Engineering News*, Feb. 8, 1999 (pp17-22).

“Our goal is a revolution in asset productivity.”

“We need growth with enhanced knowledge intensity and diminished capital intensity.”

“Ultimate sustainability, viability and the continuous development of share-holder value will require an infusion of new technology.”

PRODUCTIVITY

Any new technology must lead to an improvement in productivity. Some emerging technologies are quite fascinating from the perspective of a research technologist but a hard-boiled analysis from a business standpoint is essential. One of the problems is to confirm whether improvement in product

quality is necessarily an improvement in productivity. Perhaps we should define productivity increase as the same, or better, results at lower cost. In the sugar industry productivity may be defined in terms of overall recovery or in terms of maintenance of throughput under adverse conditions, always taking into account the cost factors.

The concept of productivity may be oversimplified if it is considered only in terms of labor productivity. In many cases, a process innovation requires substituting or additional equipment, energy or materials for the labor that is saved. Thus a proper measure of productivity change should take into consideration the changes in the quantities required of all inputs, not just labor. This concept has been called multi-factor productivity change. In the sugar industry the factors to be considered include –

- Efficient personnel utilisation.
- Low capital utilization.
- High time efficiency - high and steady throughput.
- High sugar recovery.
- Product consistency.
- Low maintenance and repair costs.
- Low operating costs.
- Low energy consumption.
- Operability or suitability.

The scope of new technology includes any combination of the following –

- Equipment;
- Processing technology and materials;
- Computer systems and automation, including design systems;
- Performance evaluation technology, including on-line analytical systems.

TECHNOLOGY OVERVIEW

For the purpose of this paper it is useful to think in terms of primary and secondary technologies. Primary technologies are the unit operations in sugar production that may or may not be optimized. Secondary technologies are used to support and optimize the primary technology. Productivity increase in the sugar industry may be more dependent on secondary technologies.

The most cost-effective approach to improving productivity is to optimize the system, especially the control aspects, rather than investing in new equipment. There is, of course, a limit to the possibility of resurrecting old equipment. The design and simulation aspects of the new secondary technology are a guide in these choices. Short-term productivity increases will be achieved using technology for optimization of current operations, with emphasis on maintenance, quality control and good manufacturing practice and training. These should be fairly easy decisions with relatively low capital investments required and the most difficult aspect is the change in mindset required. New primary technology would be part of a strategic plan for technological improvement. These involve hard decisions with high capital costs.

Constraints on New Technology

Innovation must be based on solid engineering judgement and the research and development work must be thorough and based on in-depth knowledge of the industry and its requirements. Any new technology must be sufficiently robust to cope with these variations in cane quality, especially those due to adverse weather conditions and mechanical harvesting. Improved productivity also requires that environmental impacts are minimal. For example, purification processes that emphasize physical rather than chemical treatments would be preferred.

Sources of New Technology

The sugar industry has been inclined to think of its technology as distinct and special and to develop it in isolation. Productivity increases will be achieved by utilizing the developments that are taking place in other major processing industries, especially the chemical processing industries. Optimum productivity increase, especially return on capital, requires attention to detail at each stage.

We should question whether there has been a lack of generalized industrial training and exposure of sugar technologists. Broad training and exposure are essential if new technology is to generate increased productivity.

SECONDARY TECHNOLOGIES

Secondary technology may also be defined as Process Manufacturing Information Technology. Its goal is to use the information available in the optimum manner in all aspects of process, from design through training of operators to business decisions.

The sugar industry is a data rich but information poor industry. For example, much work has been done on crystallization kinetics but it is rare that this information is used in design and even less in operations. In the end individuals must make decisions but the better the information and insight available, the better will be the productivity gains. For the goal to be achieved it is essential to take information and knowledge away from being the personal property of key individuals and transfer this to corporate or institutional memory that can be accessed by all who need to know. Although sugar production from cane or beet and sugar refining are a series of discrete operations, their interactions, especially related to energy requirements must be understood if the operation is to use its resources efficiently.

Equipment and Design

The technology used to design equipment to be efficient and reliable is critically important for industry productivity. The traditional approach to equipment design involves empirical safety factors which may be essential when control of operations is manual and the process is poorly understood. Modern design technologies allow us to create a 'virtual factory' in the computer before the factory is built. This can include all controls, piping and instrument diagrams, flow schemes and even 'virtual realities' that can be 'walked' through. Two new design technologies should be considered for new and complex equipment - computational fluid dynamics (CFD) and finite element methods (FEM).

CFD is a software system used to solve complex equations related to fluid flow and heat and mass transfer. FEM techniques are particularly useful in designs requiring non-standard shapes and complex loading situations. This technique can be used to extend the life of equipment by giving confidence that repairs and modifications are safe and reliable.

High capital costs make it difficult for factories to justify the purchase of additional equipment to match increases in grinding rate. The most cost-effective expansion may be to maximize the throughput and to accept some decline in performance.

Simulation and Modelling

Detailed process engineering is critical to identify the best plant design and also key to determining how best to run the plant. Optimization of the process flow sheet and basic engineering definitions before detailed plant design can save up to 30% of capital costs and minimize operating costs.

A question that must be asked at this stage by the sugar industry is whether we know enough about the process to be able to use these tools to their potential. All aspects of an integrated design, including models, data, documents and decision-making rationales can be saved and reused, ensuring consistency and eliminating the effort to reconstruct designs from diverse and incomplete sources.

Operations, Controls, Maintenance and Quality

The day-to-day application of secondary technology can lead to improved factory performance and should be the starting point for its introduction to operating personnel. Equipment maintenance and reliability are essential to achieve improved productivity and new technological applications in these areas are data intensive. The benefits are increased equipment utilization and delay of capital investment for replacement.

DEVELOPMENTS IN PRIMARY TECHNOLOGY

In this section recent and potential developments of new technology are described. The new technologies are of two basic types (i) the same operations but with larger, differently configured and automated equipment and (ii) a different or additional process to achieve the same goal more efficiently. The following discussion deals with developments in cane processing which are illustrative of trends throughout the industry.

Juice Extraction Systems

Milling rates are continuously increasing and upgrading a mill is very expensive and it is therefore essential to maximize the productivity of existing equipment. The goal of milling models is to predict the effect of changes in milling parameters and to assist in financial decisions. Modeling of extraction using the Australian MILSIM model has been improved to make its application more relevant to factory engineers. This model is used to assess mill performance and further development is ongoing for prediction of performance under different conditions. An Australian study presents a useful review of the decision making in choosing the expansion requirements for a mill. Although diffusion

was considered to have a number of advantages, the installation of a diffuser would require relocation of some equipment. Long term maintenance would be more with a mill plus a diffuser than with two mills since many of the spares and training would be reduced with only a single technology.

A significant new technology that could simplify mill operations is the use of electrically driven hydrostatic drives. The primary advantage claimed is that many parts of a traditional steam turbine plus reducing gear may be eliminated, leading to easier maintenance.

Purification Systems

The extent of purification required is determined largely by the sugar quality required. Conventional clarification and underflow treatment with rotary vacuum filters can produce raw sugar very suitable for refining. New technologies should not be considered until there is confidence that they can maintain capacity under all operating conditions.

The most significant work on new technology for clarification involves design optimization using CFD. The intent was to eliminate shortcomings in the standard SRI single tray, short retention clarifier. The result is a clarifier with peripheral feed and center take-off. The mean residence time can be reduced to less than half that for the standard clarifier. The benefits claimed are the reduced cost of new installations and the modification of existing clarifiers at about 10% of the cost of a new clarifier and a capacity increase of 50%.

Rotary vacuum filters are preferred in raw sugar factories for several reasons. Automation is not one of them. Maximization of productivity requires the technology for control of cake thickness, bagacillo content, rotational speed and quantity of wash water.

New technology for more efficient processing of clarifier mud remains a challenge and the optimization of rotary vacuum filters remains, for the present, the best option. Flexible diaphragm chamber press filters are standard in beet operations and have been introduced into carbonatation refineries. In trials in sugar mills they have been shown to produce much less and drier cake than rotary vacuum filters with low sugar content in the cake.

A desirable option would be to eliminate the filters entirely. The mat of shredded cane in a diffuser is a fairly efficient filter and the proposal has been made to recycle the clarifier underflow to the diffuser and thereby eliminate the filters. The results of trials in South Africa showed that this recycle had no adverse effects on extraction or bed percolation and additional sucrose loss in the diffuser was not observed.

The most intensely discussed new primary technology for sugar cane operations is membrane filtration. Research work on membranes in the sugar industry area has been intense and optimism high. One of the initial expectations of this technology was that it would replace standard clarification techniques but this has not been achieved. There is no doubt that this technology can lead to improved sugar quality. Increased recovery is a reasonable expectation but yet to be demonstrated on a commercial scale. Other benefits claimed are reduced evaporator scaling, juice sterilization, increased utilization of downstream equipment and as pretreatment for other new unit operations such as juice softening and chromatographic recovery of sucrose.

The major issues related to the introduction of membrane filtration are –

- High cost.
- Complexity and maintenance issues.
- Sophisticated automation.
- The handling of the retentate or reject stream.
- System ruggedness. A membrane system cannot be considered a success until full capacity is achieved under all operating conditions.
- Membrane lifetime and the development of efficient cleaning systems.

The development of this technology is in its early stages. Part of the learning process is making mistakes and not every attempt to apply membrane technology will be successful. Neither of the factory scale membrane filtration systems, one using ceramic membranes and the other with polymeric capillaries, has met expectations and both are currently not operating. Reliability and reasonable operating costs remain the goals. The current problems will be solved but whether the final result is an increase in productivity is quite another question.

Ion-exchange and adsorbent technologies have potential application in the cane sugar factory for demineralization, softening and color removal but may be more applicable in refined sugar production. However, with the increased emphasis on the production of direct consumption sugars at the cane mill or on the production of very high quality raw sugars requiring minimal refining, some of these techniques may be applicable.

The fundamental technology for softening or deashing is well known and the benefits of softening may be divided into two categories –

- The prevention of the precipitation of insoluble calcium salts.
- The suitability of the softened process material for subsequent processing by ion-exclusion processes for recovery of sucrose.

New technology for the efficient and environmentally benign regeneration of both ion exchange resins and adsorbents is essential. ISEP^R technology is designed to be more efficient in the use of both the stationary phase and regeneration chemicals. A large number of small columns are rotated on a carousel through a fixed system of ports to allow the sequential contact of the solid phase with process liquor, wash water and regeneration chemicals. Good results have been published on the operation of a variety of pilot plant test systems.

An alternative approach for both decolorization and demineralization has evolved out of work with the chromatographic recovery of sucrose from beet molasses. Major advantages of this approach are mechanical simplicity and complete automation and that no regeneration chemicals are required. This new technology has the capability of producing high purity liquor with low color and very low ash from clean and softened cane syrup. This process is currently in the development stage.

The chromatographic recovery of sucrose from molasses has yet to become established for cane. This subject has been much studied with various options for pretreatment but no commercial plant is yet in operation. In contrast to the use of membrane filtration the application of chromatographic separation in a cane operation requires a radical rethinking of the process. If implemented the only

crystallization would be for commercial sugar and recovery would be by chromatographic means. The productivity benefits could be immense.

Evaporation

New technology for evaporation is intended to improve the capacity of existing equipment and to improve energy efficiency. Essential to these goals is an adequate understanding of the thermodynamics of evaporation and its application to control systems, an example of the importance of secondary technology.

A model has been developed as a simulation tool for evaporator designers and operators and tested against experimental data to improve the model. This model can be used to simulate performance under varying conditions, including changes in tube size and material and scale formation. There have been several differing reports on recently installed falling film evaporators with data indicating that they are easy to operate, control and clean to problems in achieving the expected results with these evaporators. The conclusion could be that subtle differences in evaporator design could have major impact on performance.

Crystallization

Crystallization is the *sine qua non* of the sugar industry and has been practiced for centuries without being well understood. The goal is higher quality sugar by means of better control of crystallization conditions. Modeling is a valuable tool in the optimization of the crystallization operation and there are many reports on this subject. A model has been developed which can predict the color of sugars from various crystallization schemes and good agreement was achieved between the predictions and actual factory performance and it also predicted the impact of variations in operating conditions. Material, energy and color balances were used to predict that replacement of A- and B-crystallizers by a back-boiling system would not increase sugar color and should improve exhaustion.

Models for use in crystallization studies should be dynamic and include factors such as crystallization kinetics, inversion kinetic, color development rate, and the impacts of purity changes in feed materials, pan circulation rate, etc. The capacity of an old pan has been doubled by using the top and bottom of an old pan and inserting an extended mid-section with an expended body. The consequences include reduced fine grain and improved cycle times.

Efficient vacuum pans using vapors from other pans are another means to reduce steam utilization and lower color sugar due to the reduced temperature of crystallization of the high-grade products. Expansion of existing capacity for a continuous pan requires additional cells and in one case the expansion of capacity was achieved by the addition of three modules in series at the end of the original pan. Knowledge of the improvement in productivity of batch vacuum pans by improved circulation; improved feed quality and instrumental control were used in the design of these modules.

Production of commercial sugars by cooling rather than evaporative crystallization has a long history but has been out of fashion since the development of the vacuum pan. Recent re-evaluations of high temperature cooling crystallization show that it could offer major benefits for new construction. CFD

has been applied to the study of low-grade crystallizers. The simulations indicate that flow and temperature distributions are non-uniform with significant short-circuiting of non-cooled massecuite.

The conclusion is that, for crystallization, increased productivity will be gained by application of modeling and simulation systems and improved process control. We can expect to see new designs of pans and crystallizers but these will be based on process manufacturing information technology.

Centrifugation and Sugar Handling

Batch centrifugals have become much larger and energy efficient but the major development has been in continuous centrifugals for high-grade sugar. This technology has been applied commercially at several locations and there remain some design and operating problems to be resolved. There can be major problems of reliability at high throughput, lump formation and crystal breakage. Until these are resolved, the benefits of increased productivity will not be realized.

The combination of improved purification; crystallization and centrifugation technology will result in much higher quality sugar that cannot be handled in bulk in the same manner as conventional raw sugar. This will present a serious challenge to the sugar technologist, especially those with experience only in raw sugar production.

SUMMARY

The potential for productivity improvement in the cane sugar industry by application of new technology is very significant. The short-term benefits will be gained primarily by application of knowledge based technologies for design and process optimization rather than by introduction of new processes and these benefits are applicable throughout the industry. Membrane filtration and chromatographic separation have major potential depending very much on local circumstances. Productivity enhancement with these technologies will be critically impacted by their efficient integration into the whole factory process.

OPENING REMARKS:
FARMLAND PROTECTION-EXTENDING PAST SUCCESSES INTO THE FUTURE

Deputy Secretary of Agriculture Richard E. Rominger

My thanks to Carl Bouchard and his colleagues in the Natural Resources Conservation Service for coordinating this program and to Ralph Grossi, Gus Seelig, and John Vincent for joining us and for what they do for our farmland every day.

The very fact that we're here, at this Outlook Conference, discussing farmland protection, says more than any of us can about the national visibility this issue is gaining. The outlook forum is a yearly benchmark. It gives us a chance to take stock, assess what's important, sound an alert if needed, and reset our course.

Including farmland protection on the agenda for the first time ever -- in the 75-year history of this conference -- is an alert that we've got to do a better job. That's something that folks like my good friend Ralph Grossi have been saying for many years.

Ralph, this is the third time this year that we've gotten together on farmland protection -- that's some kind of a record for February. Last month, we were both in Chicago with the Soil and Water Conservation Society. And two weeks ago, I was on hand when the American Farmland Trust gave its prestigious Steward of the Land Award to the Uphoff brothers, 4th generation family farmers from Wisconsin.

What's happening is that the momentum that's building throughout the nation -- from influential, vocal forums like the Soil and Water Conservation Society and the American Farmland Trust to the quiet, environmental example of thousands of farmers like the Uphoffs -- are pushing farmland protection into the national spotlight. As Ralph has long pointed out, our farmers demonstrate that economics can be balanced with environmental stewardship ... and that's something the nation is beginning to appreciate.

As a farmer myself, with three sons back in Yolo County, California, doing a fine job of sustainable farming -- building ponds in the foothills, preserving habitat along the Pacific Flyway -- I feel that we're long overdue for a national understanding of that balance.

As a nation, we must rededicate our efforts to conserving the health of our nation's landscapes -- public, private, and urban lands. That means stressing the links between landscape health and economic health.

It's up to the people in this room to make sure that as a nation we don't talk about sustainability without talking about agriculture's relationship with its urban neighbors. This is the nation's neighborhood and we've got to talk about it.

As a nation, we've got to face the loss of our farmland. The next century is about to happen -- and the numbers aren't good.

Consider this. More than 80 percent of our fruits, vegetables, and dairy products are produced near urban areas. These farms face the threat of insidious urban sprawl. Since 1960, about 1&1/2 million acres a year have been converted to other uses, disappearing under the concrete to urban, suburban, and rural development.

Beyond total acreage lost, we've got to consider the quality of the land being converted. In most states, prime farmland is converted at two to four times the rate of less-productive land.

This clock is ticking ... it's like the classic story of the commuter who had recently moved to the countryside. Desperate to catch his train, he called to a farmer busy herding his cows along the road. "Hey, grandpa!" Is it all right with you if I take a shortcut across your field? I've got to catch the 8:15!" And the farmer said, "Go ahead, young fella -- but if my bull sees you, you'll catch the 7:45."

If we, as a nation, catch the 8:15, we may be too late. We need to accelerate the debate. We need more rural-urban interaction. We need folks to sit down and talk. We need to get builders, developers, homebuyers, planners to understand that they -- as well as farmers and ranchers -- will shoulder the cost of urban sprawl. And it won't be cheap.

We need the kind of recognition that Vermont Governor Howard Dean outlined in his State of the State Address -- and Gus Seelig, if you're talking with the Governor, please pass along my thanks. Governor Dean said, "We have an extraordinary opportunity to preserve what we value about Vermont's landscape and keep our sense of community. If you think these values are not at risk, look around you at other states: forest lands stripped, big-box stores turning downtowns into ghost towns; grazing fields now supporting condominiums. We in Vermont have a rare gift, a chance to encourage the best growth possible, while holding off the worst aspects of urbanization paving over too much of America."

The fact is, farmland loss jeopardizes the next century in ways the urban population and some rural folks haven't yet come to grips with -- not just less food but air quality, water quality and supply, energy costs, congestion, wildlife habitat, the nation's rural character, not to mention loss of open space and sense of place. Losing our land compromises our ability to deal with problems ranging from social and economic to environmental.

This is the complex of "livability" issues that the President and Vice President are tackling through two new budget initiatives aimed at giving communities tools to preserve green spaces, curb urban sprawl, and support the work of farmers like John Vincent. These proposals will build on the Vice President's plans for "Smart Growth" in America that include protecting America's prime farmland from development. The Administration has proposed more than \$75 million in federal funds in the year 2000 for the Farmland Protection Program.

Under Farmland Protection, which was authorized by the '96 Farm Bill, farmers can continue to farm without development pressures to sell their land. Long-term capital

improvements are made. Rural economies are sustained, and valuable farmland preserved.

There's a real philosophy here -- the sense that we must approach our lands as an investment in our national future. That's an approach I brought last spring to the graduating class of the College of Agricultural and Environmental Sciences at the University of California, Davis.

Let me tell you a little about that. The invitation to speak at my alma mater was an invitation to speak about any of the huge range of issues USDA works on -- trade, food safety, science and research, biotechnology, risk management.

Maybe it's because the college is so close to the Central Valley of California, the last great Mediterranean-climate, agricultural production area left on earth. Maybe it's because of my conviction that protecting our farmland is the single issue that makes all the others possible. For a number of reasons, I opted to talk primarily about farmland, and I opted to challenge those young people with the wisdom of Richard Critchfield and Wallace Stegner.

After studying civilizations around the world, historian and writer Richard Critchfield concluded that, "A civilization begins to decline when it loses touch with its agrarian roots." And writer and conservationist Wallace Stegner wrote in 1981 that, "It would promise us a more serene and confident future if ... we began to listen to the land, and hear what it says, and know what it can and cannot do."

At this point, it's my pleasure to open this panel with three individuals who do a great job of listening to the land at the national and state levels, and working the land on the farm.

Our first speaker is Ralph Grossi, President of the American Farmland Trust since 1985. The Trust is a national nonprofit organization dedicated to halting the loss of productive farmland and promoting farming practices that sustain the environment.

Ralph is a third-generation California farmer and managing partner in the family partnership raising specialty beef. He's a 1971 graduate of California Polytechnic State University. Ralph is a co-founder and chairman of the Marin Agricultural Land Trust and has served as president of the Marin County Farm Bureau. He's on the Board of Directors of several organizations, and serves on advisory boards that include academia -- such as the Yale School of Forestry -- and other organizations. He holds numerous awards, dating back to the 1976 Outstanding Young Farmer and Rancher of the California Farm Bureau Federation. It's my pleasure to introduce Ralph Grossi.

Thank you, Ralph. Moving now from a national to a state perspective on farmland protection, I'm very pleased to introduce the gentleman who probably understands that issue better than anyone for the state of Vermont. Gus Seelig is a 1976 graduate of Goddard College. He's been Executive Director of the Central Vermont Community Action Council, a low-income advocacy and community development organization. Gus has served Vermont as a member of boards and associations that range from regional planning, transportation, housing finance, and community action, to firefighting.

Gus has been Executive Director of the Vermont Housing and Conservation Board since its start in 1987. In that time, Vermont has invested more than \$100 million in programs, with outstanding results --

- * 234 farms conserved, totalling over 78,000 acres
- * 4800 units of housing developed or rehabilitated
- * over a quarter-of-a-million acres of natural and recreation lands protected.

Here to tell us about the state's accomplishments and how they go about it -- I'm pleased to introduce Gus Seelig.

Gus, thank you very much. Turning now to the actual business of farming with farmland protection, we're very pleased to have John Vincent discuss his experiences with the Delaware Agricultural Lands Protection Program and the federal Farmland Protection Program. John holds degrees in Biology and Chemistry. He is first and foremost a farmer and owner of Cedartree Farms in Sussex County, Delaware. He's also President of Development and Water Services in southern Florida. He has headed the Water Treatment Division of Consolidated Food Corporation and served as Vice President of the ITEK International Division of Oxford Chemicals. John holds a patent on a wastewater process and is a consultant to the government of Bermuda on wastewater issues. Please welcome -- from the nation's First State -- John Vincent.

Thanks to all of you for joining us. And thanks to Ralph, Gus, and John for sharing their thoughts and expertise to give us a complete perspective. To wrap up this session, I want to leave you with a couple of thoughts to take back home. As Secretary Glickman pointed out yesterday, we're losing 50 acres of farmland every hour of every day. Isn't it high time that we plan to grow smartly? The U.S. population will reach 390 million in 50 years. Are we prepared to manage our lands so those who follow us will be able to enjoy farmland as we know it today -- and will we do it responsibly?

To keep the discussion open, I encourage you to be with us in Philadelphia June 6th through 9th for the "Keep America Growing Conference -- Balancing Working Lands and Development." It will be an excellent forum. I believe Carl has copies of the announcement. Thank you ... and I hope to see all of you in Philadelphia.

AN OVERVIEW OF NATIONAL TRENDS AND POLICY DIRECTIONS

Ralph Grossi

President, American Farmland Trust

The recent surge in local and state efforts to protect farmland suggests rapidly rising concern over the loss of farmland and its impacts. In last November's elections over 70% of more than 200 initiatives to protect farmland and open space were approved by voters across the nation. In recent years Governors Engler, Voinovich, Jones, Pataki, Wilson, Whitman, Bayh, Glendenning and others have supported or initiated farmland protection efforts to address this problem. Nearly every day this year major newspapers have carried articles about sprawl and "smart growth", frequently citing farmland protection as one of the key components of the latter. And the President highlighted the need to help communities protect "farmland and open space" in his State of the Union speech.

All of this activity begs the questions: Why save farmland? What are the factors driving public interest in farmland protection?

The answers have little to do with food security.

Twenty-five years ago, the issue of farmland loss was first raised by northeastern states over a concern for food security in the region. Escalating commodity prices and a truckers strike had exposed the vulnerability of the northeast to its dependence on long distance transportation of food. An aggressive farmland protection program was quickly developed in Massachusetts, following the lead of Suffolk County, New York's purchase of development rights program in 1973. Other states followed in short order. When the National Agricultural Lands Study (NALS) was released in 1980, it was the first major study to document the insidious problem of the loss of farmland to urban sprawl over the decades since WWII. The outward migration from city to suburb was taking a toll on this nation's best land.

While NALS' claim, that more than 3 million acres per year were being lost to development, was disputed by its critics, there was little doubt that large amounts of the nation's best land had been paved over, and that the problem was continuing. One of the shortcomings of NALS was that it did not take a closer look at which land was being lost. Critics argued then (and some still do) that the US has more than enough land to fill its needs for the foreseeable future, citing the vast acreage that has been in government sponsored set-aside programs as an example; but the simple truth is that not all land is created equally. The marginal, erosion-prone lands of the Plains, for example, cannot replace the highly productive land of the Salinas or Central Valleys of California, the deep fertile soils of Illinois, or the rich bottomland of the Connecticut River Valley. Recent studies by American Farmland Trust have documented that more than 80% of this nation's fruits, vegetables and dairy products are grown in metropolitan area counties or fast growing adjacent counties – in the path of sprawling development. And a 1997 AFT study found that over the past decade more than 400 thousand acres of prime and unique farmland were lost to urban uses each year.

But one should not get caught up in the “numbers game”. The fact is that every year we continue to squander some of this nation's most valuable farmland with the expectation that this land can be replaced with other land in this country or abroad, or with new technologies that promise to help maintain the productivity gains of the past half century. The reality is that we don't know whether new technologies will keep pace. What we do know is that whatever those technologies will be, it is likely that they will be more efficiently applied on productive land than on marginal land where higher levels of energy, fertilizer, chemicals and labor per unit of output are required. Simply put, **It is in the nation's best interest to keep the best land for farming as an insurance policy against the challenge of feeding an expanding population in the 21st century.**

Community Values

Long term food security is one reason to protect this nation's best farmland, but there are more immediate impacts of farmland loss that are just as compelling – because farmland produces a lot more than food and fiber. Here are some of the reasons why state and local communities across the country are demanding more tools to protect farmland.

I. Important element of the local economy.

In many regions of the nation, enough farmland is being paved over to place the remaining farms at risk, due to the lack of a critical mass of land and services to support agriculture - farm machinery, supplies, marketing outlets, etc. Too often, while local leaders work to bring new business to a community they overlook agriculture as a true “wealth generator” – an industry that brings value to the community from renewable natural resources. In many traditional farm communities citizens are awakening to the prospect that this important, consistent economic base is at risk; and they recognize that one of the solutions is to ensure that the land base is protected. This calculus has little to do with the global food supply and everything to do with the value of farming to local economies.

II. Local supply of fresh produce.

Likewise, few consumers are concerned about food security, but an increasing number would like the option to buy locally grown produce. A resurgent interest in farmers' markets and the demand for locally grown produce by major supermarket chains, fine restaurants and upscale consumers is evidence that the consuming public is increasingly convinced that locally grown produce is fresher and healthier. While this demand is still a very small segment of the marketplace, it can represent a politically potent basis for farmland protection

III. Aesthetic / environmental values important to an increasingly suburban population.

Ironically, the suburban sprawl that threatens so many historically farm communities may be the basis for its salvation. Residents increasingly frustrated with long commutes, deteriorating public services and a loss of the scenic views, watershed protection and wildlife habitat, that is so much a part of their quality of life, are among the strongest advocates for farmland protection. The working landscape around our cities adds value to the life and property of all the residents of a given community. And in some cases, farms that are far from the city add critical values; for

example, the protection of farms hundreds of miles from New York City is helping improve the water quality and reduce water treatment costs for the residents of Manhattan.

Increasingly, farmland protection is seen as an inexpensive way to protect scenic vistas that enhance the community for both residents and visitors while keeping the land in productive use on local tax roles. Farmers are "producing" a valuable product for their new suburban neighbors – environmental quality; and farmland protection programs such as purchase of development rights and the use of conservation easements have become mechanisms to compensate them for these "products".

IV. A Component of "Smart Growth"

Containing growth within reasonable urban growth areas makes sense for both environmental and fiscal reasons. Numerous studies show that more compact development is more cost effective in the delivery of a wide range of publicly funded services from police and fire to sewer, water and transit. As more communities struggle with the problems of suburban sprawl, farmland and open space protection is emerging as a key strategy of smart growth. Again, techniques such as purchase of conservation easements add an element of fairness to the difficult challenge of achieving public goals while balancing private property rights by providing a means of compensation for value received by the community at large. They are also seen as a reasonable balance to the regulation needed to implement growth management strategies – the fairness often lacking when zoning alone is applied.

V. Community Structure

In many traditional farming areas threatened by sprawling development, farming is a key cultural component that represents important but difficult to quantify values to the community. To these communities the issue of farmland protection is best captured in the simple question: "What would we like our community to look like in the future?" If the answer includes agriculture, then steps need to be taken to ensure that the land base needed for its survival is secured. In that way the "family farm" values that our society feels so strongly about can be maintained along with the character of the region. In short, farmland protection is seen as an antidote to the "geography of nowhere".

The notion of protecting farms for anything other than its agricultural value makes some in agriculture uneasy; but as the values associated with farming are more clearly identified (and quantified) by this increasingly suburban society, the farm community is becoming more comfortable with the prospect of marketing "non-food" products. The challenge before us is to develop more efficient channels for distribution and remuneration. This is the process that is evolving as we speak.

Making Farmland Protection Work at the Local Level

Gus Seelig

Executive Director, Vermont Housing and Conservation Board

Thank you for the opportunity to make this presentation today about the work of the Vermont Housing and Conservation Board with local communities to protect farmland in the State of Vermont.

Background

The Board was established in 1987 in response to a very real crisis in the State of Vermont when real estate values were increasing at a rate of 1% a month and properties such as lakefront was increasing at 2% a month over a several year period. Our program, as you can tell by its name, is diverse. Farmland preservation is the cornerstone of our conservation efforts but we provide funding for recreational lands and natural areas, along with assisting communities in the development and rehabilitation of affordable housing. We see this mission as intertwined - because the more we can make our communities livable and focus housing development in our town and village centers, the less pressure there will be on farmland.

Farming is still our third largest industry and our relationship with the land in Vermont is rooted at a very deep level. Some of you may have heard of Fred Tuttle, a 79 year old dairy farmer from Tunbridge. Fred made a light-hearted Vermont movie called "Man with a Plan", about a retired farmer, who in need of supplemental income, decides to run for Congress and defeats an incumbent by one vote. To give you some sense of the importance of farming and farmers in Vermont, life imitated art last year when a fellow named Jack McMullen, a millionaire from Massachusetts, moved up to Vermont, rented an apartment in Burlington, and at the urging of the Republican party decided he would run for the senate nomination to oppose Pat Leahy, a chief supporter of farmland conservation over the last decade. Fred's movie had gotten a fair amount of play and Fred decided, with a \$30 budget, to throw his hat in the ring. The turning point in Fred's quest to win the primary nomination came in a debate with Mr. McMullen when he asked two fundamental questions. First, he asked how Jack would pronounce the name of my home town of Calais. Jack look at the spelling and said, well Calai. Fred then asked how many teats on a cow. Jack admitted he didn't know and Fred won the nomination.

The purchase of development rights program is part of a multi-dimensional policy effort to support our farm communities. The other important policies have included U.S. value taxation, establishment of the Northeast Dairy Compact and development of agricultural lending programs.

According to the State Department of Agriculture, Vermont had 1,783 dairy farms in business at the end of last year. This figure represented a net loss of 31 farms in 1998, compared to a loss of

69 farms in 1996. Even more encouraging, the period from July '98 to January '99 actually saw an increase of 8 farms shipping milk. This was the first time in decades that the trend had reversed itself.

Almost since the beginning of the state's history, agriculture has played a major role in shaping Vermont's economy, landscape, and rural character. Many Vermonters are therefore saddened and alarmed when good farmland is lost to house lots, malls, and pavement. In 1960 Vermont counted more than 12,000 farms within its boundaries, comprising approximately 3 million acres, or half the area of the entire state. By 1987, when the Vermont Housing and Conservation Board was created, the number of farms had dropped to 5,877, and the farm acreage had been reduced to less than half its total in 1960. In 1992 the state approximately one million acres in ag use according to the Census of Vermont Agriculture.

Agriculture continues to be the state's third largest industry in terms of gross receipts. Farm size has increased through consolidation of agricultural lands, productivity per farm has increased, and labor efficiency has improved dramatically as farmers have modernized their facilities and upgraded their management techniques. Vermont's PDR program has been a source of capital for this effort with purchases on 234 farms totalling 78,471 acres.

The VHCB Farm Program

VHCB administers the purchase of development rights program in close cooperation with nonprofit land trusts. The applicant organizations perform much of the direct landowner contact and project development work, as well as provide technical services at closings and, once projects are completed, assume a major role in easement monitoring and enforcement. This has enabled a relatively small staff at VHCB to focus on project selection and policy issues.

All farm conservation easements funded by VHCB are co-held by the Board, a nonprofit land trust, and the Department of Agriculture. By having three holders of each easement, the burden of easement stewardship is shared, and in the event one of the three organizations is dissolved, the remaining co-holders ensure that the easements are upheld in perpetuity.

The partnership between VHCB and the nonprofit land trusts also produces significant additional project funding from private sources. For instance, the Vermont Land Trust, a private nonprofit, has been particularly successful in obtaining foundation grants for farmland conservation to match the State's effort.

The VHCB Selection Process

In Vermont many more farmers wish to sell development rights than there is money available, therefore, the VHCB Board devised a two-step application process and set up a committee of farmers and agriculture professionals to provide advice to the Board on project selection. The Board receives 200 inquiries and 8-120 pre-apps annually.

A project that is successful at this preapplication stage may then be submitted to the VHCB Board for funding. An appraisal of the development rights value must be conducted. VHCB will share

the cost of the appraisal with the landowner, but once an agreement is reached concerning what land would be conserved and what land, if any, would be left out of the easement for future housing or other nonfarm uses. In general VHCB insists that most or preferably all of the tillable land on a given farm project be conserved. This means that if the farmer wishes to exclude a parcel for future development, he may only do so on nontillable or nonproductive land.

The projects are selected at both application levels using the Board's adopted policy for farmland conservation, which spells out the following criteria in decreasing order of priority: soil resource, location, farm infrastructure, and resource management. Additional, nonagricultural enhancements are called "other values."

The Board, with assistance from staff members who have visited the farms, analyzes the quality of a farm's soils for continued agricultural use, aiming to protect only those resources that have the best potential for viable farm production now and in the future.

The second criterion is location. The policy describes two factors: "farm community" and "development threat." Proximity to other operating farms and farm services is considered a plus, especially if a project expands an existing block of conserved farms. Threat is determined by factors such as amount of road frontage, potential "buildable" sites, and local real estate market conditions.

The third criterion is farm infrastructure. Here the Board tries to determine if the farm has buildings and facilities that are adequately suited to the type of enterprise being conducted. If not, the Board assesses the probability of good infrastructure being added in the future.

Under the final criterion—management—the Board examines past and current soil, water, and wildlife conservation practices. This criterion is especially important if federal NRCS funds administered through VHCB are to be used for the developments rights acquisition. The NRCS funds are conditioned on a farmer's compliance with a plan to manage highly erodible land.

The "other values" that the Board considers include historic, natural, or recreational resources on the farm. The Board views these characteristics as secondary to the primary goal of protecting viable economic farm units that rank high for soils, location, infrastructure, and management.

Farm Viability and Economic Impacts

From the beginning of the VHCB program, farm viability has been an underlying theme. Agriculture represents the third largest sector of the state's economy, contributing more than \$500 million in farm receipts annually. The state's tourist industry also relies on agriculture to maintain the scenic landscape that has made Vermont famous. The protection of viable farms from development is therefore seen as an economic investment for the state.

The conservation dollars spent in Vermont's farm communities help to prime local economies. By selling development rights, many farmers have been able to reduce and reorganize their debts, thereby improving their cash flows and allowing them to make new investments in land, machinery, buildings, or livestock. This spending by farmers supports local enterprises such as

feed, fertilizer, and equipment dealers, and pumps cash into countless other businesses. It has been said that every dollar spent in the farm sector turns over five to seven times, creating business gains throughout the community.

But in the long run farms remain viable only as long as there are people willing and able to farm. When an older couple quits farming, the sale of the property must provide enough money for retirement, but at the same time, if the farm is to remain in production, a buyer must be found who can pay a fair price without incurring excessive debt. Selling development rights has become the means by which many Vermont farms are transferred to a new generation of farmers.

A retiring farmer can sell development rights for perhaps 40 percent of the unrestricted fair market value, and can then sell the conserved farm for the remaining 60 percent of the original value. In this way the retiring farmer receives full value for his asset, while the beginning farmer buys the farm at a substantial discount. By facilitating these intergenerational transfers, the VHCB program has given numerous young, qualified farmers a crack at farm ownership. We believe that the successful transfer of ownership to these enthusiastically dedicated young farmers is clear evidence of the VHCB program's important role in maintaining Vermont's tradition of economically viable, family-owned farms.

Examples: Swanton and East Montpelier

Twenty-one VHCB-funded farm projects, most of them contained in two huge blocks of contiguous land, have been completed in Swanton, a town in the northwestern part of Vermont, where the land flattens into a broad fertile valley between Lake Champlain and the Green Mountains. Four of the Swanton farm projects facilitated intergenerational family transfers, and an additional six of the projects enabled sales to other farmers not related to the sellers.

Dairy farming is profitable in Swanton for a number of reasons: the land is easily tilled and productive, agricultural support services and suppliers are readily available, and the farms—many of them now conserved—typically abut one another, creating whole neighborhoods where the landscape and the lifestyles remain distinctly agricultural.

But Swanton farmland, like farmland throughout the state, faces threats from encroaching development. Swanton is located on the outskirts of a regional commercial center, and is within easy driving distance of the state's major urban area, Burlington. These factors have fueled the residential growth in Swanton, while the proximity of Lake Champlain has spurred the development of approximately 300 vacation homes in the town.

To combat this growth, Swanton's municipal plan calls for the concentration of new development in existing villages rather than dispersed in the rural countryside. The plan also recognizes the importance of agriculture to the local economy, and notes the decline of active farms in town, from 65 in 1985 to 54 in 1990. The plan states: "...the town should continue its efforts to preserve and maintain agriculture as a viable economic activity and should also assist in the protection of significant open land resources by collaborating with land management and protection organizations such as the...Vermont Housing and Conservation Board."

In the more hilly country of central Vermont, VHCB's funding has also been tapped to protect agricultural land. For instance, in East Montpelier, just outside the state's capital city, five farm projects totaling 1151 acres have been completed with VHCB assistance. Local support played an important role in all of them. The town government contributed over \$100,000 to the projects, and private contributions from local residents also helped in the effort. A key benefit for the public in the East Montpelier farms was the inclusion of public access provisions in a portion of the easements. Since completion, these projects have demonstrated that well-managed public access for hiking along designated trails can co-exist with commercial dairy farming.

In summary, Vermonters continue to demand and financially support farmland conservation. The program is key to maintaining community identity. It has also become recognized as an ag development tool, whether for inter-generational transfer, expansion or infrastructure improvements. Vermont's partnership with nonprofit land trusts has broadened community support and raised substantial private matching funds.

FARMING WITH FARMLAND PROTECTION

John D. Vincent

Farmer, Sussex County, Delaware

Perhaps the main thrust of what I want to convey today, would be "How Farmland Preservation Program dollars have benefitted my Farm operation.

Let us examine what constitutes and is considered a "young" farmer!? I believe that I read somewhere that the average age of a farmer on the Eastern Shore is about 66 years old. Contrary to appearances and the way I sometimes feel, I am relatively young in the business.

Farming has become virtually out of reach for a young person, say 20 to 30 years old. The reason for this is that farming has changed from a labor intensive operation to a capital and cost management operation. Start-up costs have become exorbitant due to two (2) major factors:

1. The capital cost of land.
2. The capital cost of the necessary farm equipment.

The equipment cost can be mitigated through shopping used equipment and or leased equipment. On the other hand land values continue to spiral upwards (in our area) primarily due the intangible added value as a result of development potential.

However this trend can be offset, by enrolling land in the Farmland Preservation Program. This program provides the farmer with up front State Agricultural funds in exchange for the farmer agreeing to retain the land for agricultural use only. Effectively the farmer has the advantage of immediate funding and simultaneously have retention of full ownership of the land. As an added benefit, by eliminating the farms' development potential the land becomes less expensive and more affordable for young farmer wishing to start-up or expand.

Farmland Preservation also acts as an environmental investment. With the pressures of attempting to service debt and produce a profit leave people such as myself with no alternative, except to double crop. Another very important consideration is the importance of planning my crops and utilizing the best forecasts available, such as:

1. Crop sale price forecasts.
2. Cost per acre tillage estimates.
3. Fertilization costs.

Crop sale prices and crop costs per acre are relatively easy numbers to project and develop. On the other hand fertilization costs have a variable that is, or can be very costly to the farmer, in addition to being harmful to the environment.

Put yourself in my shoes for a moment. When I plan my crops, should I plan for fertilizing for a good seasonable growing season yield? Or should I instead plan on a drought type yield? Of course you

want to plan on a seasonable yield, but what if you experience drought? One key that I have found for successful farming is the intensive utilization of liquid nutrients. The application of liquid nutrients is simple and easy to control. The plants rapidly absorb these nutrients and mature to their maximum potential.

We have now experienced two years in a row of drought during our major crop season. If the plants did not utilize the full potential of liquid fertilizers, what happened to the balance?

Because of the sandy soil on the Eastern Shore, a portion of these nutrients reach our ground water table. A portion of the contaminants which is reaching our water table must be attributed to the advent of double cropping, hence double fertilization! As this cycle continues, how long will it be before our good water sources become non-potable?

With two years of drought behind me, I wonder how many pounds of nutrients even from my small operation have found their way into the ground water.

Just think for a minute. Nitrates in ground water may be consumed by a milk cow. The natural process of a cow does not remove nitrates from its' milk. This same milk goes to schools as nourishment for our children. Nitrates tend to "rob" oxygen from your bloodstream and make you lethargic. Did you ever hear anyone say, "kids don't play like they used to. All they want to do is sit around". I wonder of the unused nutrients such as nitrates could be a part of this problem?

In addition to croppage, I also raise chickens. Chickens create litter and litter creates odors. There is no such thing as a 100% odorless chicken farming operation. If someone next to an agricultural preservation area is going to spend a considerable sum for a home, they need to be advised beforehand of this fact. They also need to be informed that the farmer has certain rights and protection under the Farmland Preservation Program, to continue his operation.

The cost of having to defend an odor complaint in court, could easily run into thousands of dollars. These funds come directly out of the farmers' pocket with absolutely no offsetting benefit! On the other hand we realize that someone who has spent many tens of thousands of dollars for a home, has a right to fully enjoy their lifestyle.

The new home-owner needs to be advised with full disclosure beforehand, in order to minimize friction between the homeowner and the farmer.

As for my operation, the injection of Farmland Preservation Dollars has meant that the way of life that I knew as a child will now be perpetuated. That the land which my father inherited from my grandfather and that I inherited from my father, will be able to remain a farm so that I can continue to be a contributing member to our agricultural community and the greater community of society and the environment.

THE OUTLOOK FOR FOOD PRICES IN 1999

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After increasing 2.2 percent in 1998, the Consumer Price Index (CPI) for all food is expected to increase 2 to 3 percent in 1999. Food at home is projected to increase 2 to 2.5 percent while food away from home should increase 2.5 to 3 percent. The 1998 increase of 2.2 percent was the smallest increase for all food CPI since 1993 and follows the baseline projection of an average growth rate of 2.3 percent from 1998 to 2008. Although 1999 looks like another good year for consumers, there are three factors that may determine if the increase for all food is closer to 2 or 3 percent.

The first unknown is whether the sluggish export market for beef and higher-valued cuts of pork and poultry continues throughout 1999; the second factor is if the expected 2 percent increase in milk production can meet consumer demands for butterfat products in 1999, including gourmet ice cream, cheese, and butter; and the third uncertainty is whether higher expected retail prices for oranges and bananas continue longer than the first six months of 1999. The late December 1998 freeze that hit the citrus areas of central California is expected to raise retail prices for fresh oranges 40 to 50 percent for the first 6 months of 1999. Also, higher retail prices for bananas are expected throughout 1999 and peaking in April, due to tropical storm Mitch which hit the banana growing areas of Honduras and Guatemala especially hard in November 1998. Combined, these food categories account for 39 percent of the food at home index: beef, pork and poultry account for 19 percent, dairy and related products account for 11 percent, fats and oils (including butter) account for 3 percent, while fresh fruits account for an additional 6 percent.

Retail food price changes are underpinned by general economic factors that influence food prices and the relationship between farm and marketing costs. In recent years, food price increases have been small due to the low general inflation rate, which is forecast to increase 2 to 3 percent in 1999 after increasing 1.9 percent in 1998; a larger share of the food dollar going to purchases of food away from home, which has averaged 45 percent the past two years; the continued decline in the farm value share of the retail price for most food items, which is expected to average 23 to 24 cents in 1998 and 1999; and increasing economies of size in the farm sector.

Food price changes are also a key variable determining what proportion of income consumers spend for food and what is left for purchases of other goods and services. In 1997, 10.7 percent of household disposable personal income went to pay for food, with 6.6 percent for food at home and 4.1 percent for food away from home. The downward trend in the proportion of household disposable personal income used for food should continue into 1998 and 1999. Preliminary figures on food sales for 1998 show food at home spending up 1.9 percent and away from home spending up 1.0 percent. After adjusting 1998 food sales for inflation, which provides an indicator of food quantities actually purchased, food at home spending went down 0.1 percent

while food away from home spending went down 1.5 percent. With continued competition between grocery stores, restaurants and fast-food establishments, this pattern is expected through 1999.

The food at home CPI increase of 2.2 percent in 1998 was moderated by lower grain prices and adequate feed supplies, large supplies of competing meats, adequate supplies of coffee, increased sugar production, and strong competition in the soft drink and prepared food industries. The 1998 CPI increase of 2.6 percent for food away from home was less than the previous year. The smaller increase in the 1998 index was partly due to adjustments by restaurants and fast food establishments to the tighter labor markets. In addition, competition among restaurants and fast-food establishments remained strong in 1998 with lower costs for raw materials, especially food, contributing to a smaller index increase.

A discussion of some individual categories of the CPI for food can help explain price changes in 1998 and expected changes in 1999. In summarizing 1998 food price increases, large consumer demand coupled with stagnant milk production contributed to higher retail prices for dairy products, especially high butterfat items; reduced fresh fruit and vegetable supplies due to El Nino and Hurricane Mitch led to substantial retail price increases; and modest increases in the indexes for sugar and sweets, cereals and bakery products, and other foods were the result of adequate supplies and a small increase in the all items CPI index. In summarizing 1998 food price decreases, large competing supplies of meats led to retail price decreases for beef and pork; lower feed prices led to larger egg production and a drop in retail prices; and adequate coffee supplies along with competition among the soft drink producers for market share led to lower prices for these items in the nonalcoholic beverages index.

- **Beef and veal.** Commercial beef production is expected to decline 2 to 3 percent in 1999, with further reductions in 2000. Economic slowdowns in Asia and Russia resulted in worsening U.S. beef trade balance in 1998. The strong U.S. economy led to a rise in beef imports of about 11 percent in 1998 with exports growing less than 1 percent. Trade is expected to be more in balance in 1999 as world beef supplies decline, slowing U.S. imports to 3 to 4 percent. Also, U.S. beef exports are expected to rise 7 to 9 percent, largely the result of food aid programs to Russia. After falling 0.2 percent in 1998, the CPI for beef and veal is expected to increase 1 to 2 percent in 1999. Continued record large supplies of competing meats at even lower prices relative to beef will hold down large retail price increases. However, as supplies decline, retail beef prices will begin rising modestly in spring 1999.
- **Pork.** With expectations of plentiful supplies of pork and competing meats throughout 1999, pork retail prices are expected to fall another 3 to 4 percent, after falling 4.7 percent in 1998. Pork production increased 10 percent in 1998, leading to the largest per capita consumption rate increase since 1994, increasing almost 4 pounds from 1997 levels. With fractionally lower production and exports expected to increase 10 percent, per capita pork consumption in 1999 will decline slightly from 1998 levels. U.S. pork exports in 1999 are expected to be over 1.3 billion pounds, up from more than 1.2 billion pounds in 1998.

When hog prices were historically low in late 1998, concerns were raised about retail prices and why they did not drop as sharply. Different demand situations can explain why retail prices do not parallel that of hog prices. First, contractual agreements between hog producers and slaughter plants are increasingly the norm with only about 10 percent of slaughter hogs sold in the open spot markets. When the available slaughter hog supply exceeds plant capacity (e.g., fourth quarter 1998), slaughter plants lower their bid for the available supply of hogs, which sharply reduces spot market prices. Likewise, when slaughter facilities are at relatively low rates of utilization (e.g., third quarter of 1997), packers bid up hog prices sharply.

Second, pork retail prices are generally slow to react to farm price changes and generally do not fluctuate as much as producer or wholesale prices. Historically, it has been found that declines in the farm value of pork take over a year to be passed on to consumers, while increases take about 4 months. In addition, retail values don't rise at the same rate or to the same degree as farm values. For example, in 1990 the net farm value for pork increased 24 percent but the pork CPI index increased by only 14.7 percent in 1990 and 3.3 percent in 1991. Similarly, when farm values fall, retail prices tend to fall less than the pork farm values. In 1991, the net farm value for pork fell 10 percent with an additional decrease of 14 percent in 1992; but the pork CPI index declined by only 4.7 percent in 1992. More recently in 1996, when the net farm value for pork increased 27 percent, the pork CPI index increase was less, 9.9 percent in 1996 and 5.2 percent in 1997.

Retailers strive to offer a variety of meat/poultry products to consumers knowing that increased sales in one meat species comes at the expense of another. And during the holidays, retailers found that they were able to move pork without significant retail price reductions, as pork supplies met rising retail consumer demand at the price range set by retailers.

- **Other meats** increased 0.9 percent in 1998, and in 1999 prices are expected to increase up to 1 percent. Other meats are highly processed food items (hot dogs, bologna, sausages) with their price changes influenced by the general inflation rate as well as the cost of the meat inputs.
- **Poultry.** Broiler meat production for 1999 could increase to 29.4 million pounds, about 5 percent above 1998. However, 1999 turkey production is forecast to be 5.25 million pounds, fractionally below 1998. Turkey producers are recovering from 2 years of negative returns, which has held down production increases. Broiler meat exports are forecast to remain weak through much of 1999, with first-half exports expected to be 20-25 percent lower than 1998. Export prospects for U.S. poultry have become less certain due to the continuing financial crisis in many Asian countries and loss of the Russian market. As these factors continue into 1999, increases in production will likely lead to lower retail prices for much of the year, despite reduced supplies of red meat. The poultry CPI is expected to change slightly, between -1 and 1 percent, after increasing 0.3 percent in 1998.

- **Fish and seafood.** The CPI for fish and seafood was up 2.6 percent in 1998, with an expected 2 to 3 percent increase in 1999. More than 50 percent of the fish and seafood consumed in the U.S. in 1998 came from imports, with another 20 to 25 percent from U.S. farm raised production. Imports for 1998 were up, especially for salmon, shrimp, tilapia, mussels, clams, and oysters. Strength of the U.S. dollar to other currencies favors a rise in imports, especially from the Asian countries.

The U.S. has one of the world's largest farm-raised fishing industries with year-round production. Domestic production of catfish reached record highs in 1998, about 560 million pounds, with catfish growers expected to expand through 1999. In the 1990's, U.S. per capita seafood consumption has remained flat, between 14.8 and 15.2 pounds of edible meat per year, with any increases in total domestic seafood consumption coming from population growth. However, a strong U.S. economy is expected to boost away from home food demand as people travel and eat out more. This is especially important for seafood, as a large percentage of seafood is consumed at restaurants.

- **Eggs.** After volatile egg prices in 1996, the CPI for eggs fell 1.5 percent in 1997, was down another 3.3 percent in 1998, and is expected to fall 1 to 3 percent in 1999. With table egg production expected to be about 2 percent higher in 1999, consumption is expected to increase again, to the highest level since 1988. Higher production levels and slower growth in exports led to lower retail prices in 1997 and 1998, as well as expected lower prices in 1999.
- **Dairy products.** Robust demand and stagnant milk production produced record retail prices for milk and most dairy products throughout most of 1998. Increased demand and lower feed costs should provide a strong incentive to boost milk production in 1999, however increased production may not occur until the second half of 1999. With milk production expected to increase a modest 2 percent in 1999, the milk CPI is forecast up 4 to 5 percent in 1999 after increasing 3.6 percent in 1998. Strong consumer demand for dairy items, especially gourmet ice cream, cheese, and butterfat products, is expected to continue into 1999.
- **Fats and oils** increased 3.7 percent in 1998 and are expected up another 3 to 4 percent in 1999, after increasing a modest 0.9 percent in 1997. The index increase was largely due to BLS' movement of butter from the dairy products index to the fats and oils index in 1998. Higher retail prices for butter, which accounts for 31 percent of the fats and oils index, contributed to the increase. The remaining items contained in the fats and oils index are highly processed food items, with their price changes influenced by the general inflation rate in addition to U.S. and world supplies of vegetable oils. Soybean oil is the primary oil used in the production of vegetable oil products, however the relationship between soybeans and the retail price of vegetable oils is complex. Soybean oil is a joint product with soybean meal, which is primarily used for animal feed.
- **Fresh fruits.** Reduced production of most summer 1998 stone fruits and fall 1998 pears, helped to boost retail fresh fruit prices in 1998. The 1998 U.S. apple crop, which was up

9 percent from a year ago, helped mitigate retail price increases for other fruits. In 1998, U.S. grape production declined 14 percent, the pear crop was down 12 percent, peach production fell 9 percent, apricots were down 6 percent, sweet cherry production fell 12 percent, strawberry production in the six major production states was down 7 percent, and blueberry production fell 8 percent. Production of tart cherries and cranberries was up slightly. Imports provide most of the tropical fruit supplies in the U.S., with bananas, mangoes, pineapples, and papayas the most popular.

The 1997/98 U.S. citrus crop increased 5 percent over the previous year, mostly because of a record orange crop, which was up 9 percent. However, a cold snap in California's San Joaquin Valley in December 1998 caused USDA to lower orange production estimates for 1998/99. Before the freeze, the wet and cool conditions in California along with drought conditions in the spring in Florida reduced U.S. orange production by 21 percent compared to 1997/98. After the freeze, the orange crop was forecast to be 27 percent smaller than last year's record crop of 13.9 million tons, with California's production down 49 percent. Because California produces about 80 percent of the fresh-market oranges in the U.S., retail prices for oranges are expected to increase 40 to 50 percent for the first six months of 1999. Imports from other countries, including Australia and Mexico, along with diversion of part of Florida's orange production (mostly used for juice) to the fresh market should offset some of the reduced supply from California. To offset the declines in orange juice production, some of the fresh-market California oranges damaged in the December freeze were sent for processing. Fresh market oranges from Arizona and the California desert areas will be available summer 1999.

After seasonally lower banana prices in 1998, higher retail prices are forecast for most of 1999. Tropical storm Mitch, which hit the banana growing areas of Honduras and Guatemala in November 1998, caused major damage to the crop. Historically, Honduras and Guatemala combined have supplied about 30 percent of the U.S. market for bananas. In 1999, Ecuador, Costa Rica, and Columbia, who historically have supplied 60 percent of the U.S. market, will attempt to fill the supply gaps caused by tropical storm Mitch. In 1999, the impact on retail prices should occur as early as February or March, with prices peaking in April. Retail banana prices are forecast to increase up to 15 percent in the first six months of 1999, and an additional 8 percent the last half of the year.

Higher retail prices for fresh oranges, which accounts for 20 percent of the fresh fruits index, along with expected higher prices for bananas--another 18.5 percent of the fresh fruit index, raises the price forecast for 1999. The fresh fruit index, which increased 4.3 percent in 1998, is expected to increase 7 to 8 percent in 1999 due to the expected higher prices for fresh oranges and bananas, along with steady U.S. consumer demand for fresh fruits.

- **Fresh vegetables.** El Nino-driven cold, wet weather in Florida, California, and Mexico reduced fresh-market vegetable supplies, disrupted planting and harvest windows, and raised retail prices throughout the first half of 1998. In addition, tropical storm Mitch caused wind and water damage to some central Florida vegetables in early November. As a result, the fresh vegetable index increased 10.9 percent in 1998.

Fall acreage was down in 1998, with 2 percent fewer acres of fresh-market vegetables and melons harvested in fall 1998. Acreage of cool-season crops (lettuce, carrots, broccoli) declined 1 percent, while that of warm-season crops (tomatoes, bell peppers, snap beans) dropped 3 percent. Tropical storm Mitch damaged several of the fall-season vegetable crops in Florida, snap beans and radishes were damaged and some fields required replanting. In addition, product quality of vegetables like tomatoes and eggplant were temporarily reduced and yield potential diminished. Strong winds caused some bloom loss for tomatoes and peppers, reducing supplies and causing higher consumer prices into early 1999. Mitch also flooded cantaloup fields in Costa Rica and Honduras, which could result in higher cantaloup prices in early 1999.

Harvested acreage of 13 selected vegetables is forecast to rise 3 percent to 193,500 acres during the 1999 winter season (January-March). Adding to the large domestic supplies this winter will be imports from Mexico. Fresh-market vegetable acreage is expected to increase about 1 percent in calendar year 1999. Potato production, which increased 2 percent in 1998, is also expected to increase another 1 percent in 1999. If the weather and growing conditions in the major fresh vegetable growing areas returns to normal in 1999, the fresh vegetable index is forecast to fall 1 to 3 percent.

Processed fruits and vegetables. Production of the four leading vegetables for processing (tomatoes, sweet corn, snap beans, and green peas) was down 2 percent in 1998, after a 3 percent decline in planted acreage a year earlier. Per acre yields were below a year ago for tomatoes (down 7 percent), green peas (3 percent), and sweet corn (2 percent). Yields were higher for snap beans (up 3 percent). For 1998, wholesale prices of canned vegetables and juices averaged 1 percent above the previous year, leading to minimum pressure on retail prices. The ready availability of canned and frozen vegetables, frozen concentrate orange juice and other fruit supplies kept the CPI increase for processed fruits and vegetables to 1.7 percent in 1998, with an expected increase of 2 to 4 percent in 1999.

- **Sugar and sweets.** Domestic sugar production was up to 8.0 million tons in 1997/98 and is projected up another 3 percent in 1998/99 to 8.3 million tons. Higher sugarbeet prices and lower prices for competing crops led to acreage increases in both years. Along with higher sugar output, lower retail prices for selected sugar-related food items in 1998 increased the sugar and sweets CPI by only 1.6 percent. Although U.S. sugar consumption has grown at a rate of about 1.9 percent per year since 1985/86 and sugar use by industrial users has risen, the CPI is projected to increase a moderate 1 to 3 percent in 1999.
- **Cereal and bakery products** account for a large portion of the at home food CPI - almost 16 percent. While higher grain prices contributed to higher retail prices for selected bakery products in 1996, lower grain prices in 1997 and 1998 held the increase to 2.0 percent in 1998. Most of the costs to produce cereal and bread products are for processing and marketing, more than 90 percent in most cases, leaving the farm ingredients a minor cost consideration. Competition for market share among the three

leading breakfast cereal manufacturers led to the cereal component of this index falling 9.7 percent from 1995 to 1996, with an additional decrease of 1.4 percent from 1996 to 1997. In 1998, cereal prices increased slightly, up 1.3 percent. With strong demand for cereal and bakery products, as well as competition among producers expected to continue, the CPI for cereals and bakery products is expected to rise at a rate of 2 to 3 percent in 1999.

- **Nonalcoholic beverages.** Coffee and carbonated beverages are the two major components, accounting for 15 and 38 percent of the nonalcoholic beverages index. After increasing 3.7 percent in 1997 due primarily to higher coffee prices, the index fell 0.3 percent in 1998. Lower coffee prices and strong competition in the soft drink industry by the two major competitors continued throughout most of 1998. After increasing almost 13 percent in 1997, coffee prices fell almost 3 percent in 1998 and carbonated beverages were down 1.4 percent in 1997 and another 1 percent in 1998.

Brazil's 1998/99 coffee harvest reached a near-record 36 million bags, a third of the world's total and 50 percent above the 1997/98 marketing year. The current large Brazilian crop is forcing other countries to cut prices, which should continue to lower prices in the U.S. Brazil is the largest producer of arabica coffee beans which are preferred for gourmet coffee blends. The U.S. imports up to 80 percent arabica beans along with 15-20 percent robustas, used mainly for soluble (instant) coffee or blended with arabicas.

U.S. retail coffee prices have fluctuated since 1994, when Brazil experienced a major freeze to their coffee trees. Recent near-record production should lead to larger U.S. stocks and continued lower consumer prices. With coffee prices continuing to decline, along with competition in the soft drink industry, the CPI for nonalcoholic beverages is expected to moderate at a 1 to 2 percent increase.

- **Other prepared foods.** Other miscellaneous prepared foods are highly processed and are largely affected by changes in the all-items CPI. These products include frozen dinners, pizzas, and precooked frozen meats. Competition among these products and from the away from home market should continue to dampen retail price increases for items in this category. In 1998, the CPI for this category increased 2.7 percent and is expected to increase 2 to 3 percent in 1999.

Changes in Food Price Indicators, 1997 through 1999

<u>Items</u>	<u>Relative importance ^{1/}</u>	<u>1997</u>	<u>Final 1998</u>	<u>Forecast 1999</u>
	--Percent--	-----Percent Change-----		
All Food	100.0	2.6	2.2	2 to 3
Food Away From Home	37.1	2.8	2.6	2.5 to 3
Food at Home	62.9	2.5	1.9	2 to 2.5
Meats	10.9	3.0	-1.9	-1 to 1
Beef and Veal	4.8	1.7	-0.2	1 to 2
Pork	3.8	5.2	-4.7	-4 to -3
Other Meats	2.2	2.8	0.9	0 to 1
Poultry	3.2	2.8	0.3	-1 to 1
Fish and Seafood	2.2	2.3	2.6	2 to 3
Eggs	0.8	-1.5	-3.3	-3 to -1
Dairy products	6.8	2.4	3.6	4 to 5
Fats and Oils	1.9	0.9	3.7	3 to 4
Fruits and Vegetables	9.1	2.0	5.7	2 to 3
Fresh Fruits and Vegetables	7.0	1.7	7.3	3 to 4
Fresh Fruits	3.6	0.8	4.3	7 to 8
Fresh Vegetables	3.4	2.9	10.9	-3 to -1
Processed Fruits and Vegetables	2.1	2.4	1.7	2 to 4
Sugar and Sweets	2.5	2.9	1.6	1 to 3
Cereals and Bakery Products	10.0	2.1	2.0	2 to 3
Nonalcoholic Beverages	7.0	3.7	-0.3	1 to 2
Other Foods	8.5	3.2	2.7	2 to 3

^{1/} BLS estimated expenditure shares, December 1997.

STATE OF THE FARM ECONOMY: HOW GOOD OR HOW BAD?

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Introduction. I have been in the policy analysis and long term projection business for almost 30 years. Most of the time has been devoted to establishing a funding base that permitted the development of large scale models that are global in scope. This modeling effort necessitates combining the economic and policy structures associated with planted land area, livestock production and global population into a uniform system. Long run projections are developed that serve as a base of reference for policy analysis. Currently, seven universities with about 60 researchers are devoted to this effort. At any given time a total of 5-10 Ph.D. students are involved in research projects that complement dissertation requirements. The University of Missouri and Iowa State University anchor the FAPRI Consortium with support from the University of Arkansas, Texas A&M, Arizona State, Kansas State and North Dakota State. My comments are based on the efforts of this very dedicated team of researchers - ¹the baseline analysis presented in January, 1999 at our annual Kansas City, Missouri Review. I hope my comments do sufficient justice to their efforts, however, observations expressed in this paper are solely the responsibility of the author.

Some Observations. Anyone that enters the projection game is going to make mistakes. However, the one that stands out most from all others in my mind is underestimating the potential for the expansion of global production and corresponding supply of agricultural commodities. Every time I bought the notion that global demand for agricultural commodities was going to outpace global supply with corresponding sustained increases in commodity prices, I have been wrong. So one of the first things that I do as our analysis nears completion each year, is to examine our expected price projections, contrast them to previous historical averages and evaluate differences from our last baseline. Which case won out this time. Are we entering a period of tighter supplies with higher prices or did the supply side prevail once again with lower prices? Our current baseline reflects one of the lowest price paths in recent memory and is well below levels expected in February of last year. So once again, it appears that the supply side prevails. What made this difference is the subject of our discussion today.

Why The Current Low Prices of Grains and Oilseeds? The FAPRI Team was asked this question by the House Agricultural Committee in July of 1998. Dr. Gary Adams' testimony before the committee on ²"The Outlook for the U.S. Agricultural Economy" addressed significant contributing factors. His conclusions point in three directions. First, increases in global production fueled by expanded area and exceptionally good crops in 1996, 1997 and 1998 is the leading contender. Approximately 50 million acres of land was added to global planted area in 1996, another testimony to the responsiveness of the supply side. The calendar has to be rolled back to 1985, '86 and '87 to find three years with consecutive weather patterns that compare with the last three years. Second on the priority list was the global economic situation led by the precipitous downturn in the Asian-Pacific rim countries. Third is the FAIR Act. The new Farm

Bill released about 15 million acres of land for additional production by eliminating annual land idling.

In fairness to our modeling team, price estimates in January of 1998 were already on the decline reflecting both the expected increase in acreage and the market nature of the FAIR Act. What was not anticipated was the magnitude of the Asian financial situation and the continuation of the phenomenal weather pattern, both here and in South America. The weather pattern carries the most weight with regard to the estimated price differentials.

Our baseline projections start from a lower base than last year and hold this level for the next two to three years. There is little hope for near term optimism given the current global projections. Global economics are expected to decline over the next two to three years by about 0.5 percentage points from 1998. Taken in conjunction with the fact that baseline projections are conditioned on trend levels of technology growth and average weather, it is unlikely that current stock levels will be significantly reduced. China continues to be a major factor in the equation. There is considerably more optimism this time around with regard to China's yield growth. A reevaluation of the last two years suggests a more aggressive pace than was factored into previous analyses. This results in, for example, a net export position for corn through about 2002/03.

An additional near term caveat is weather. Holding prices at near term levels, as projected over the next two to three years, will require at least average weather in all years. Although stock levels are projected higher, they do not compare with levels carried under previous government programs. Moderate dry weather will quickly reclaim lost ground, moving prices back to longer run averages, for at least one growing season.

Longer Run Price Outlook. For some years our analysis has suggested an interesting balance between global supplies and demand of grains and oilseeds. Examination of conditioning information revealed some interesting characteristics. First, with regard to technology growth, we tended to hold a path that was at or near the rate of global population growth. Second, with expected average weather patterns this tended to suggest very little increases in crop land area. This balance generally prevailed throughout our projections unless weather problems erupted or global income demand began to exceed previous levels of expectation. So, in general, our projections suggested moderate increases in nominal prices and moderate stock reduction over time.

In the mid 1990's things began to change. There was greater excitement over the potential world income growth. Among the many questions debated was "why now?" WEFA and Project LINK financial statistics suggested that real global GDP growth averaged above 2.5 percent for the decades of the '70's, '80's and '90's. Why the sudden interest in income growth if all decades have been at or near the same level? The answer tends to be associated with the sustained (30 year) levels of income growth and the likelihood of the same in the next decade. This simply implies that a substantial number of people around the world have finally reached an income level that places greater demand on meats. As a result our analysis tended to reflect a stronger export path. And our models began to reflect increasing export demand.

Price projections tended to move above long run averages for grains and oilseeds, by the end of the 10 year horizon. Global stocks became progressively tighter and modelers scrambled to find additional land area that was required to make up the difference.

We never did join the euphoric scene about export expansion, however in both the crops and livestock models were indicating export demand growth. And our price projections were generally on the optimistic side.

Were we wrong or will this occur again? Answer, if income growth returns our models will again reflect this growth. And this is exactly what does occur in this 1999 baseline. *But, this time there is a decided difference and therefore a major turning point from previous analysis.*

This decided difference is associated in large part with a change in our assumption about technology growth. A number of countries reflect more aggressive adoption rates than previously estimated. This may well be another characteristic of the global supply potential. Higher prices in 1996 and 1997 plus concerns of food shortages seems to have fueled the supply side once again.

The resulting pace of technology expansion, particularly in places like China, Brazil and Argentina, tends to outpace the rate of global population growth, which is projected to decline over time. This leaves slack in the system unless demand strengthening can override or weather patterns begin to change for the worse.

Starting from a low price and moderate near term income growth simply shifts the entire global momentum, at least for the next three to five years to a low side price path for grains and oilseeds. Projected growth for U.S. corn yield, for example, is 1.3% per year and global yields weighted for major production regions suggest a growth rate of 1.5% per year.

The corresponding world population growth rates imbedded in the current projections suggest growth rates of 1.3% through 2002 then falling to 1.2% afterwards. Developed countries are well below this average, as is China. However, developing countries that are lower on the income scale are at a faster pace of 1.6% per year led by Africa at 2.5%.

Although prices are projected lower, there will still be regions of the world with large populations that suffer from food shortages. Our models do account for these characteristics on a region or country basis. A blend of population and purchasing power sets the pace for global demand.

Expected Prices. Wheat prices tend to be an exception to the price path for grains and oilseeds primarily reflecting lower planted acres and a continued strong concentration of land in the CRP. The decade of the '80's and '90's averaged about \$3.35 per bushel but is expected to increase to around \$3.50 per bushel in the next decade.

Soybean prices are projected to average below \$6.00 per bushel (\$5.52) for the next 10 years starting at a low of about \$5.08 for the 1999/2000 crop and gradually increasing to around \$5.90 by 2008/09. This is well below average of previous decades - almost 70 cents below the decade of the 1980's and about 50 cents below the decade of the 1990's.

Table. 1

FAPRI JANUARY 1999 BASELINE PROJECTION RELATIVE TO HISTORICAL AVERAGES			
	80-89	90-99	2000-08
Real World GDP Growth (%)	2.7	2.5	2.9
U.S. Farm Price (\$1bu)			
Corn	2.45	2.38	2.28
Soybean	6.19	5.97	5.52
Wheat	3.35	3.34	3.49
Planted Area U.S. (Acres)			
Corn	75.7	70.2	80.3
Bean	64.1	64.0	70.4
Wheat	76.7	77.5	66.6
Planted Area Brazil & Argentina (Acres)			
Corn	38.4	39.9	37.4
Beans	32.0	43.0	53.1

The corn projected path is similar. The projected \$2.30 per bushel average for the next decade is about 20 cents below the 90's estimated average and 15 cents below the average of the 80's.

This softness in world market prices of grains and oilseeds also reflects a stronger turn around in world income growth. WEFA and Project LINK projections indicate a return to stronger growth by 2001, implying strength in at least 7 out of the next 10 years.

If our technology growth assumptions used in previous baselines had been maintained it is certain that current price projections would be at higher levels.

Summary and Conclusion. Price variability continues to be a major factor in the equation. Even with the stronger production path, projected stocks-to-use ratios are well below historical levels. ³Dr. Gary Adams of FAPRI at Missouri presented a paper at the 1998 AAEA meetings that focused on the issue of greater price variability in agriculture. He replayed previous weather patterns with stock levels more consistent with the current farm program. The drought of 1988 was buffered with about 4 billion bushels of corn stocks that resulted in a season average farm price of corn at \$2.54 per bushel. Without these stock levels, the models replayed a season average price of \$3.50 per bushel. If these higher prices should occur and reasonable weather returned, a two year adjustment period was necessary before prices returned to baseline levels.

Given the nature of the FAIR Act with no braking mechanism on the supply side and the fact that government stocks are no longer a part of the equation, this poses an interesting pattern for prices in the future. In the first half of the next decade, prices will tend to the low side, even with poor crop years. Short crops followed by trend level production will replenish stocks fast enough to quickly return prices to the low side. But, if the projections are correct as income growth rebuilds in the latter part of the decade stocks again appear to become tighter. The income growth component tends to catch up and starts once again to overpower the stronger technology component. Stock become continuously tighter. This makes for a different situation. Short years will hold prices higher longer, as indicated in the analysis by Dr. Adams.

But given either scenario, prices on the high side, staying longer and alternatively on the low side - staying longer, it is very likely that prices during the crop year will show spurts of quick rapid movement. Three weeks of dry weather this spring will send prices scurrying upwards. If it rains across the corn belt the next day all price strength will very likely be lost. So, even if good crops tend to prevail, the market will continue to be very nervous in streaks of dry weather.

Stated another way, my conclusion regarding price patterns in front of us is for staying power on the low side in the first half of the decade followed by staying power on the high side in the latter half. In either case we are likely to see a good deal of price movement within the crop year.

Finally, even with the likelihood of higher-highs in the latter part of the decade, this will simply speed up the rate of technology adoption which means the next cycle will move back into a lower price range. As I mentioned in my opening remarks, the supply side has staying power.

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THE GLOBALIZATION OF THE U.S. COTTON MARKET

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When I was initially asked to speak on this topic, I was at first overwhelmed and then intimidated by the subject matter. After I caught my breath and gave some thought to the idea, I realized that my views, my approach, and my actions toward the cotton market have been and still are shaped in great part by the recent turbulent and volatile activity in the global economic and financial markets. For instance, there are some days when I wake up and wonder which hat will I be wearing to work based on the business news of that day. Will I wear a currency hat, an Asian stock market hat, a Fed Reserve hat, or hopefully, leave my hedge fund hat at home. It is not just brokers or analysts or business managers who have become attuned to the impact of the world's economic difficulties on cotton demand and therefore prices here and abroad. During the height of the Asian stock market crisis, a customer who is a merchant in the SE, indicated he found himself getting up in the middle of the night to check the Tokyo and Hong Kong stock markets based on their possible effect on cotton futures the following morning. Everyone involved in the US cotton market has become far more aware of a whole host of global factors that are significant in not only our daily dealings but in our projections for US cotton.

The effects of the globalization of the US cotton market have been more obvious this year and last but can be traced back much further. There are two ways in which I will examine the recent globalization of the US cotton market, a timeline perspective and a domino effect. Let us begin by examining the timeline of world events and the direction of cotton prices beginning in the Summer/Fall of 1997. Years of unrestrained growth, questionable lending policies, over-expansion and poor fiscal policies by various countries in the Far East began to take their toll on currency values and stock market prices by August 1997. The crisis appears to have begun in Thailand but quickly spread to Indonesia, Taiwan, Malaysia, South Korea, the Philippines and also encompassed an already weak Japan. Currency values quickly depreciated by at least 10% and in some instances as much as 50% initially. Throughout 1998, continued devaluations became an almost daily event. Many countries were plunged into a serious recession, if not depression, where they have remained with negative GDP growth during 1998 with predictions of the same in 1999 and possibly into 2000. As the purchasing power of these countries dropped, so did their ability to buy US cotton although ultimately as seen this crop year, their ability to export textile products would be greatly improved over time. During 1997/98, the world supply of cotton would grow by almost 3 million bales where as the world demand fell marginally resulting in a jump of world stocks of 3 million bales, 2 million of that housed inside China. From July 1997 to April 1998, the A index fell by more than 17 cents with the US futures falling by an almost identical amount as the market attempted to absorb the higher supply and also stimulate demand. The last leg of this sell-off in US and World prices would be prompted by a surprisingly

high USDA March 31 Planting Intentions for the US followed up shortly by China's entry into the export market with 1 million bales.

By May 1998, a delivery based squeeze struck the July 1998 contract forcing futures to recover all of their loss and ultimately move to new contract highs resulting in a rally of almost 25 cents. Also playing a very prominent role in pushing futures higher was a growing concern for inadequate rainfall adversely affecting acreage in the West Texas region along with low irrigation supplies. Though the crisis in Asia had not eased, our attention was diverted to events at home as each subsequent USDA report reinforced our own ideas of an ever- dwindling US crop. By late June, new crop futures hit a high of 78.00 basis the December 1998 contract and remained in the mid to low 70's range over the next three and a half months as we postulated about just how low US ending stocks might fall. At its lowest level, US stocks were forecast at 2.3 million bales based on a crop of 13.2 million bales, although lower demand held the stocks to usage ratio to a more comfortable 15%. With a crop 30% lower than 1997's and the lowest in a decade, even higher prices, if not now, then later, certainly seemed in the cards. After all, in the summer and fall of 1995, the US cotton futures market rallied from the low 70's to the high 90's in just over 2 months as the crop size was cut by more than 4 million bales to 17.9 million bales. So why not higher prices for the US market in the wake of this year's much smaller crop in the US? During most of July and August of 1998, the A index remained nearly unchanged or only modestly lower.

However, by September, the lack of demand and the burgeoning new crop supply began to re-exert itself resulting in renewed downward pressure on the A index and ultimately futures. The lack of demand for cotton and the soon to be followed lower prices proved merely to be symptomatic of the ongoing global economic fears as reflected through the sizeable break in stock market values in the US, Europe and Asia to multi-month lows during September and October, 1998. Part of the financial pressures stemmed from the collapse of Russia's banking system pressuring the ruble to much lower levels which in turn forced Yeltsin's government to default on large foreign loans. Back at home, our interest was deflected to the possible failure of a little known hedge fund, Long Term Capital Management, as its collapse and subsequent losses could have spread to other funds resulting in an ever widening crash here in the US and overseas.

The combined effects of these erratic monetary and currency fluctuations on a global scale reinforced perceptions of just how deep-seated the weaknesses were in many foreign economies. This, coupled with concerns regarding the performance of the US debt markets and the constraints it might put on corporate borrowing, proved significant enough to prompt the Federal Reserve to ease US short term rates on 3 occasions from September to November, 1998.

From September 1998 until January 1999, the A index along with US futures continued their downward movement as buyers remained scarce and supplies hefty. Adding to the US woes was the demise of the Step 2 program as its funding was exhausted leaving US exporters unable to compete for export business and exposing the US to imports sometime late in the winter of 1999.

The expiration of Step 2 was not a surprise but did remove the insulation the US enjoyed from poor world fundamentals and therefore low world prices. Adding insult to injury, in mid- January, another shoe fell as Brazil first widened the bans on its currency, the Real, and then allowed the Real to float on the world market. Although concerns about the Brazilian economic fallout were not as great as the Asian contagion due to its perceived limited exposure, the result was another break to new contract lows by US cotton futures even as the US stock market rebounded from a

2-day sell-off. No sooner had we absorbed the news about Brazil than fears about China following a similar course of devaluation rocked commodity values including cotton, soybeans and grains. Though various high-ranking Chinese officials were quick to deny any plan to devalue the Yuan during 1999, the damage was done as cotton and other commodities dropped once again to new contract lows. This sell-off can best be exemplified through the Commodity Research Bureau Index, a basket of commodity values, which plunged to a 24-year low only last week as crude oil, grains, meats and softs including cotton all experienced a lack of demand and an excess of supplies worldwide.

By mid-February, the USDA confirmed what we had all suspected yet feared in their 1998/99 monthly supply and demand report. World demand was reduced to a 12 year low of 84.6 million bales and despite a world crop that also fell to a 5 year low, ending stocks were projected at 41.6 million, the highest level since the mid 1980's. To put the world usage figure in better perspective, think back to the early 1990's when the Soviet Union broke apart, a political event that qualifies as one the most momentous of this century. The disruption and loss of several million bales of Soviet and Eastern European mill consumption as well as the flooding of several million bales onto the world market required several years to be absorbed by the market place. This huge imbalance kept prices captive and in a trading range of the low 50's to low 60's from 1991 until 1993. The economic damage from the Soviet break-up on commodity prices was significant yet pales in comparison to the current global economic crisis that has encompassed almost every major country and region on this planet.

The effect of this year's poor fundamentals has been to push cotton futures down by more than 25 cents from last summer's highs while depressing the A index about 15 cents since the season began on Aug 1. In addition, this recent sell-off in cotton prices carries futures and the A index down to 6-year lows, last seen in the Fall of 1993.

Now that I have determined the how and the when of world economic events as they shaped US cotton prices, I will demonstrate the effects of worldwide fundamentals on US cotton if viewed as a game of dominos. We know that the initial weakness in overseas currency values in late 1997 substantially increased the cost of buying US raw cotton while the decline in overseas stock market values further reduced foreign buying power. The combined effects lowered cotton imports from the US and other exporting countries, hence leaving a larger 1997/98 crop supply with no home. With the advent of the next crop year, the need for foreign exchange by major exporters such as Uzbekistan started the sell-off in the various growths that make up the A index as sellers increasingly fought for market share. With buyers remaining sparse and an abundance of aggressive sellers, the net effect was a downward spiral of prices that may have only recently gained some stability. This downward spiral of business and of prices is similar to a row of dominos, knock the first one down and they all begin to tumble. It is interesting to note that as futures were breaking into the mid-50's two weeks ago, the A index failed to move much lower from its 55-56 cent level as sellers saw little to be gained by discounting offers while demand remained so weak according to Cotlook's daily commentary.

As the dominos representing the supply side has continued its fall, they have intersected another row of dominos depicting the mill sector that began its drop gradually but has gathered momentum in recent months. In their 1999 Economic Outlook, NCC's Economic Services stated

"The demand for textile products is directly related to income. Slowing growth rates across the world's economies spells further difficulties for textile product demand." With foreign consumers economically strapped, foreign mills increasingly were forced to turn to the export market to find a home for their products. Returning to NCC's Outlook, they state "where some foreign textile markets were only 20% export driven, many are now upward of 80%." Although the falling currency values may have first worked against many Southeast Asian countries with their raw cotton purchases, their much weaker currencies have allowed them to sell their textile goods at substantially lower prices to the chagrin of the US manufacturers. Mr. Greenspan's often quoted description of the US as an "oasis of prosperity" explains in large part why the US has been the repository of huge textile imports in the last two years and will continue to be in the near term. By most accounts, US cotton textile imports are up by almost 50% since 1995 and 1996 and according to the Commerce Department, US imports of cotton products through November 1998 increased 18% over the same period last year. Reviewing this same data shows how the fight for textile market share can disrupt traditional sources when previous customary clientele are lost. For instance, Pakistan had been exporting a large portion of its textiles - yarn, fabric and finished goods to Asia but when that market came under pressure from some of the above mentioned problems, Pakistan turned to the US as a home for its products. Per the Commerce Dept, US imports of textiles and apparel from Pakistan grew 37% (by volume) from January to November 1998 compared to the corresponding period in 1997. Pakistan is now considered the second most important source of fabric into the US displacing Mexico and number three in yarn imports just behind Mexico and Canada, the US's NAFTA trading partners. This huge inflow of Pakistani goods has prompted US authorities to take action by meeting with officials from Pakistan two weeks ago here in Washington.

Europe has not been immune to the textile import pressure as they too have been forced to try and compete against a huge inflow of cheaply priced foreign textile products. Per the Feb 5 issue of Cotton Outlook Magazine, "European Union textile interests are keen to discuss with Brussels what steps can be taken to protect their markets from the impact of imports from sources such as Turkey." The fallout for the US and Europe as well as any others in similar straits is a contraction in their own cotton consumption as domestic mills are unable to compete profitably against imports. US cotton consumption is down almost 10% this crop year compared to 1997/98 with little change anticipated in the short term. In the last two months, there have been a series of announced consolidations, closings, and mergers by US textile manufacturers that may involve upwards of 1 million bales of cotton consumption. By some accounts, the majority of this mill usage may be irrevocably lost as manufacturing facilities are moved overseas. Any improvement in US mill usage into the new crop year will be tied to the stabilization of foreign currency rates as it relates to the decrease of textile imports and just as important, the refunding of Step 2.

In each of these steps, we seem to find another reason for the dominos to gather speed as they round the corners in an attempt to complete the tumbling process. We have a major economic crisis in Asia and no sooner does the world begin its recovery but Russia deals us a major blow taking most of the world's stock markets with it. But as we patch this problem and move on, Brazil jumps in our path. We as an industry and as global participants can not but help wonder who, where and when the next problem will occur. The currency and stock markets appear to have developed a tough skin. Obviously, cotton and other commodities similarly affected have not been so fortunate thus far.

Although this globalization process may appear to have begun less than two years ago, in fact, it has been building for sometime. In the mid-80's a huge shift began in countries such as Pakistan and India to expand their textile manufacturing industry as the foreign exchange earned from exporting finished goods was much greater than that of exporting raw cotton. Countries that made up the former Soviet Union, such as Uzbekistan, have learned this same principle, as attested to by their efforts to build a textile manufacturing industry though it is still in its infant stage. Another country that has greatly expanded its mill capacity in recent years is Turkey. The US has been unique in that it has always enjoyed a large textile manufacturing sector while being a major participant in the exporting of raw cotton, albeit less in some years when we were perceived as only a residual supplier. As George Soros, the great financier said "You have political systems which are national and financial markets which are global." Not only is this true but this principle has been around since before the building of the Great Wall of China. The only difference is that now it does not take as long to move goods or currencies. The high speed at which information is communicated to everyone has exacerbated the ongoing dilemma the US cotton market finds itself in. At the NCC annual meeting held two weeks ago in Memphis, the general view was that every major segment in our industry had been adversely affected by the events of the last two years. From producers and ginneries to merchandising and warehousing to manufacturers, everyone has been impacted by the oversupply of and weak demand for raw cotton and textiles not only in the US but abroad as well. Improving the demand at the retail level for textile goods in many Pacific Rim countries would obviously alleviate many of the problems that the US industry is facing as supplies of raw cotton and textile goods would become more manageable. However, that improvement may only come from the stabilization of currency values, rising stock levels, and most important, positive GDP growth.

As we look to the future, there are trends setting the stage for the continued globalization of the US cotton market. We need only check the labels of any newly bought clothing to see this process in action. The fiber content and directions for cleaning are often given in two or more languages. As it relates to manufacturing in the US, a shift in spinning operations from the US to Mexico is underway. Again, per the NCC's Outlook, "this shift may be in response to NAFTA incentives and does involve some joint ventures with US spinners. Though the implications are unclear, this trend may bear on attitudes of various interests in the development of new parity agreements."

In closing, I ask you, are our fortunes tied to those of the Pacific Rim region, South America, Russia and Europe? The answer, in my opinion, is a resounding yes. This year and last, we have been made painfully aware of our connection with the world. As stated earlier, just as we are dependent on them to pull themselves up by their boot straps to help salvage US prices on a long term basis, they look to us as a safe haven for their goods when their own populace can not absorb them. On occasion, we may find our attention focused at home whether the issue is supply or demand-oriented. With Step 2 funding, assuming Congressional approval is granted, we may be partially insulated from the world's fundamentals but not isolated from them. The future of the US cotton market is forever linked with that of the world and all its parts. Thank you for allowing me to speak to you today.

SWEETENER INDUSTRY TRADE POLICY ISSUES ON THE HORIZON: DANGERS, OPPORTUNITIES

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It is a pleasure to have the opportunity to discuss with you the trade policy challenges facing the U.S. sugar industry.

The U.S. sugar industry is a highly competitive one -- both within the United States market and relative to the world market. Nonetheless, survival among the segments of the U.S. industry is predicated upon their ability to reduce costs of production in the face of flat nominal producer prices for sugar for more than a decade -- prices that are sharply lower when corrected for inflation.

Changes in the structure of our industry the past few years are well known, with growers in some areas exiting the business and others expanding production to increase efficiencies and reduce unit costs. Reforms to U.S. sugar policy in the 1996 Farm Bill, with less government intervention, higher producer risk, and still lower producer prices, both necessitated and facilitated these structural changes.

Meanwhile, our producers have always faced another, external, threat -- that of subsidized foreign sugar from the world dump market. Foreign subsidies are so extensive, and the so-called "world price" for sugar is so distorted, that the world price has averaged less than half the world average cost of producing sugar for most of the past two decades. U.S. production costs are below the world average, but neither the United States, nor any country, can produce sugar for the mere 7 cents per pound the world price has recently been running.

The global movement toward freer trade, thus, raises both opportunities and dangers for U.S. sugar producers.

The major opportunity: Eliminate foreign subsidies that prop up inefficient producers and the world price will rise to reflect the actual cost of producing sugar. American producers could compete head-to-head with foreign producers and there would be no need for a U.S. sugar policy designed to limit imports.

The biggest danger: Unilateral disarmament. If the U.S. reduces its barriers to foreign sugar *before* foreign countries dismantle their subsidies, efficient American producers will be displaced by foreign sugar from producers who may not be any more efficient but who are subsidized by their governments.

The opportunities and dangers are manifesting themselves in a growing number of trade policy venues. I'd like to review the major ones from U.S. sugar's point of view; provide some thoughts

on the uniqueness of the world sugar market, which trade negotiators must take into account; and outline the U.S. sugar industry's recommendations for future multilateral trade negotiations.

Trade Policy Venues

NAFTA. The U.S. sugar and corn sweetener industry's problems with the North American Free Trade Agreement are considerable.

- * **Sugar Side Letter.** Mexico had been a net importer of sugar for a number of years prior to the inception of the NAFTA in 1994. The governments of both the United States and Mexico predicted Mexico would remain an importer for the foreseeable future. Nonetheless, the NAFTA provided Mexico with more than three times its traditional access to the U.S. sugar market during the first six years, 35 times its traditional access in years 7 - 14, and virtually unlimited access thereafter.

These provisions were negotiated by the U.S. and Mexican governments and contained in President Clinton's NAFTA submission to the U.S. Congress, which Congress approved in November 1993. The sugar provisions, as altered from the original NAFTA text, were critical to the narrow Congressional passage of the NAFTA and were widely publicized in U.S. and Mexican press reports at that time.

Nonetheless, Mexico is now undermining the integrity of the NAFTA by claiming the sugar provisions are somehow invalid. Mexico's attempt to rewrite history on this issue is disingenuous, at best, and appears to be backfiring. Their actions have bred deep feelings of distrust in the integrity of trade agreements among many American producers, and could have profound effects the United States' ability to negotiate future agreements.

The stakes are high in this NAFTA dispute. At issue, basically, is whether the U.S. sugar industry or the Mexican sugar industry bears the cost of the Mexican beverage industry's inevitable conversion from sugar to corn sweeteners. The side letter limits Mexican access to the U.S. sugar market in years 2001-08 to 250,000 tons of its surplus production *excluding* sugar displaced by corn sweeteners. The original NAFTA provisions allowed Mexico to send the U.S. *all* its surplus, *including* sugar displaced by corn sweeteners.

Despite its historic net-importer status, a surge in reported production and some substitution of corn sweeteners for sugar have created a Mexican sugar surplus estimated to be about 1 million tons.

- * **Mexican HFCS Duties.** The NAFTA called for a phase out of Mexican import duties on U.S. high-fructose corn syrup (HFCS). Instead, Mexico has imposed antidumping duties as high as 100% on U.S. HFCS. The United States has requested dispute panels on this issue under both the NAFTA and the World Trade Organization (WTO). Meanwhile, the high duties remain in place.

In addition, the U.S. Trade Representative is reviewing a petition by the U.S. Corn Refiners Association, under section 301 of federal trade law, on an alleged Mexican restraint of trade agreement. Reportedly Mexican bottlers have agreed to limit the pace at which they replace

sugar with corn sweetener in beverage production. On this side of the border, a restraint-of-trade agreement of this nature would have U.S. government anti-trust attorneys working furiously toward its removal.

- * **Above-Quota Mexican Sugar.** Under the terms of the Uruguay Round, the U.S. second-tier, or above-quota, raw sugar import tariff has dropped gradually to 15.82 cents per pound this year, bottoming out at 15.36 cents next year. But under the NAFTA, our above-quota duty relative to Mexico is only 13.60 cents this year, and drops gradually to zero in 2008.

In 1994, the year the NAFTA went into effect, the world raw sugar price averaged over 12 cents, and these tariff levels seemed more than adequate to shield the U.S. market from above-quota sugar. Now, however, with the world price plummeting to 7 cents, the tariff on Mexican above-quota sugar may not be enough to prevent Mexico from dumping some world-price sugar on the U.S. market.

Stuffed Molasses. Some Canadian entrepreneurs, and others, have found a way to circumvent the U.S. import quota with a high-sugar content product generally called "stuffed molasses." USDA estimates the amount of sugar extracted from this product annually to be approaching 100,000 tons. U.S. beet processors and cane refiners have appealed to the U.S. Customs Service to reclassify this molasses so that it becomes a part of the U.S. tariff-rate quota. Customs' decision has been pending for some time.

A number of foreign countries with shares of the U.S. sugar import quota -- including Australia, the Philippines, and the Caribbean Basin Initiative (CBI) Sugar Group -- have filed statements in support of the U.S. processors' and refiners' position. They argue the loophole must be closed because it is not only a threat to U.S. sugar policy but to their own economic well being.

Sunset Reviews. The Uruguay Round called for the removal, or "sunset," of anti-dumping or countervailing duties by the year 2000 unless reviews by each country revealed the need to keep the duties in place. The U.S. Department of Commerce and the U.S. International Trade Commission are currently reviewing U.S. antidumping duties against sugar and syrups from Canada, France, Belgium, and Germany, and countervailing duties against all sugar from the European Union (EU). The U.S. sugar industry supports their retention. Decisions are expected later this year.

Fast Track. Congress last year rejected legislation to restore to President Clinton his expired "fast-track" authority to negotiate trade agreements that Congress would not be permitted to amend upon consideration. The Administration is committed to regaining fast-track authority, but it remains to be seen whether similar legislation will even be brought up for a vote this year. Administration officials say that regional and multilateral negotiations continue without fast track, but there will come a point when our negotiators' credibility will be compromised by a lack of fast track authority.

In any event, negotiations do continue on a number of fronts:

NAFTA Accession. Should fast track pass, the most likely first trade agreement vote would be expansion of the NAFTA. First in line is Chile. Since Chile is a significant beet sugar producer - about 400,000 tons per year -- we are watching this closely.

FTAA. Negotiations are underway on the proposed Free Trade Area of the Americas (FTAA), stretching from Canada to Argentina, with the goal of an agreement by 2005.

There are many major sugar exporters in this region. By far the most important is Brazil, where sugar production has exploded in the past few years as alcohol subsidies have dropped. F.O. Licht estimates Brazil's sugar output this year at 18.8 million tons, up from 16 million last year, and nearly double its production of just five years ago.

Brazil's dramatic expansion in the face of plummeting world sugar prices underscores two important facts:

- * The world sugar price does *not* reflect the cost of producing sugar, even among the most efficient producers;
- * Changes in production in Brazil, now the world's biggest single producer, are related more to government decisions about the subsidized price of alcohol than to changes in the world market price of sugar.

The Brazilian government's "Proalcool" program -- launched during the oil crises of the 1970's -- subsidized the construction of sugarcane milling/distilling facilities to produce fuel alcohol from sugar and facilitated the expansion of Brazil's cane production from 75 million metric tons in 1975 to 280 million tons last year. More than half that cane goes to fuel alcohol production. The effects of this long-term, massive subsidy program must be taken into account in any future regional or multilateral trade negotiations with Brazil.

WTO. The World Trade Organization replaced the General Agreement on Tariffs and Trade (GATT) as the forum for multilateral trade negotiations in 1995. The final year of the Uruguay Round of trade barrier reductions is 2000.

The United States will host a Ministerial in Seattle in November to discuss the possible launch of another multilateral trade round to continue trade liberalization beyond the Uruguay Round. All of U.S. agriculture has much at stake. Unilateral concessions made in the 1996 Farm Bill far exceeded our Uruguay Round commitments and have made U.S. agriculture more vulnerable to the continued use of subsidies by other countries. Future negotiations must be performed carefully to prevent the U.S. from becoming even more disadvantaged.

For example, in the next trade round, access to developed countries should be conditioned on developing countries' achievement *and enforcement* of higher labor and environmental standards. Such an incentive system could help ensure that the next trade round results in a race to the top, in protection of workers and the environment, rather than a race to the bottom. We have publicly supported the remarks President Clinton made in this regard last May at the WTO in Geneva.

Another concern is the Uruguay Round's formula-based approach, which called for across-the-board percentage reductions, regardless of the original level of price support, import barrier, or export subsidy. Countries with the most egregious barriers have maintained their advantage throughout the transition process. For example, if one country's price support were 40% higher than another's, and

both reduced by the URA-mandated 20%, the 40% advantage would remain in place -- the playing field has been *lowered*, but not *leveled*. This rigid approach needs to be replaced with a more flexible, pragmatic one.

OECD. The Organization for Economic Cooperation and Development (OECD), based in Paris, is comprised of the world's most developed countries, and is dedicated to fostering economic progress in the developing world. The OECD supplied key market data and policy analysis for Uruguay Round negotiators and is expected to do the same for the WTO.

The OECD's work on global sugar policy has been problematic in the past and warrants close monitoring by the U.S. government and sugar industry.

APEC. The Asian Pacific Economic Cooperation (APEC) talks have begun, with the aim a huge Pacific Rim free trade area by 2010. Australia, one of the world's top sugar exporters, will be a major player in these negotiations and has already begun surfacing sugar policies as a topic for discussion.

The Unique Characteristics of the World Sugar Market

There are a number of unique characteristics to the world sugar market, which trade negotiators must take into account in future multilateral deliberations.

World Dump Market. More than 100 countries produce sugar and the governments of all these countries intervene in their sugar markets and industries in some way. These unfair trading practices have led to the distortion in the so-called "world market" for sugar, and to a disconnect between the cost of production and prices on the world sugar market, more aptly called a "dump market." Indeed, for the period of 1984/85 through 1994/95, the most recent period for which cost of production data are available, the world average cost of producing sugar is over 18 cents, while the world dump market price averaged barely *half* that -- just a little more than 9 cents per pound raw value. (See chart, Attachment A.)

Volatility. Furthermore, its dump nature makes sugar the world's most volatile commodity market. Because it is a relatively thinly traded market, small shifts in supply or demand can cause huge changes in price.

During the period 1965-95, the average deviation from trend for raw sugar prices was nearly 50 percent, more than double the average deviation for corn and almost double that of wheat. Just in the past two decades, world sugar prices have soared above 60 cents per pound and plummeted below 3 cents per pound.

Other Factors. Aside from the highly residual and volatile nature of the world sugar price, there are a number of factors that set sugar apart from other program commodities. These unique characteristics should be taken into account before sugar is lumped in with other commodities for across-the-board policy reforms.

- * **Lack of Concentration.** World grain exports are overwhelmingly dominated by a small number of developed countries, but sugar exports are far more dispersed, and dominated by developing countries. This makes the playing field among major grain exporters comparatively level and policy reform relatively less complicated than for sugar.

The world wheat and corn markets, for example, are heavily dominated by a handful of developed-country exporters -- the United States, the European Union, Australia, and Canada are four of the top five exporters of each. The top five account for 96% of global corn exports and 91% of wheat exports.

The top five sugar exporting countries, on the other hand, account for only two-thirds of global exports and three of these are developing countries. The top 19 sugar exporters account for only 85% of the market, and 16 of these are developing countries. (See charts, Attachments B & C.)

- * **Developing Country Dominance.** Developing countries account for 73% of world sugar production, and 69% of both exports and imports. Developing countries were virtually ignored in the Uruguay Round of reductions in barriers to agricultural trade, and impose far lower costs on their producers for labor and environmental protections. (See charts, Attachments D - F)

- * **Grower/Processor Interdependence.** Grain, oilseed, and most other field-crop farmers harvest a product that can be sold for commercial use or stored without any further processing. Sugarbeet and sugarcane farmers harvest a product that is highly perishable and of *no commercial value* until the sugar has been extracted. Farmers cannot, therefore, grow beets or cane unless they either own, or have contracted with, a processing plant. Likewise, processors cannot function economically unless they have an optimal supply of beets or cane. This interdependence leaves the sugar industry far less flexible in responding to changes in the price of sugar or of competing crops.

- * **Multi-Year Investment.** The multimillion-dollar cost of constructing a beet or cane processing plant (approximately \$300 million), the need for planting, cultivating, and harvesting machinery that is unique to sugar, and the practice of extracting several harvests from one planting of sugarcane, make beet or cane planting an expensive, multiyear investment. These huge, long-term investments further reduce the sugar industry's ability to make short-term adjustments to sudden economic changes.

- * **High-Value Product.** While the *gross* returns per acre of beets or cane tend to be significantly higher than for other crops, critics often ignore the high cost associated with growing these crops. Compared with growing wheat, for example, USDA statistics reveal the *total economic cost* of growing cane is nearly seven times higher, and beet is more than five times higher. With the additional cost for processing the beets and cane, sugar is really more of a high-value product than a field crop.

Inability to Hedge. The 1996 Freedom to Farm Bill made American farmers far more dependent on the marketplace. Growers of grains, oilseeds, cotton, and rice can

reduce their vulnerability to market swings by hedging or forward contracting on a variety of futures markets for their commodities. There is *no* futures market for beets or cane. Farmers do not market their crop and can neither make, nor take, delivery of beet or cane sugar. The hedging or forward contracting opportunities exist only for the processors -- the sellers of the sugar derived from the beets and cane. These marketing limitations make beet and cane farmers more vulnerable than other farmers to market swings.

U.S. Sugar Industry's Trade Policy Recommendations

Shaped by our experience and by the specific failures of past agreements, the following are the ASA's recommendations for future trade negotiations:

1. Compliance with past agreements, in particular, the Uruguay Round Agreement of the WTO and the North American Free Trade Agreement, must be achieved before the United States forges any new agreements. The United States, and any other country that has surpassed its URA commitments, should be given credit for doing so before being required to make further cuts in the next trade round.
2. The United States must not reduce its support for agricultural programs, particularly for import-sensitive crops such as sugar, any further until other countries have reduced their support to our level.
3. Elimination of export subsidies, the most trade distorting of all practices, and of state trading enterprises (STE's), which were ignored previously, must be given top priority in the next trade round.
4. The wide gap in labor and environmental standards between developed and developing countries must be taken into account in the next trade round, to provide both incentives and penalties that ensure global standards rise to developed-country levels, rather than fall to developing-country levels.
5. A flexible, request/offer type of strategy must be followed in the next trade round, rather than a rigid, across-the-board, formula approach. Only in this manner can we address the huge disparities in supports among nations and turn the United States' unilateral concessions to our advantage. We must provide foreign countries the incentive to reduce their government programs by promising to reduce ours further when, and only when, they have reduced their export subsidies, internal support, import tariffs, and STE or similar practices to our levels.

OUTLOOK FOR DAIRY

James J. Miller
Economic Research Service, USDA

Dairy market conditions in 1999 and 2000 are expected to differ dramatically from the sluggish milk production and record milk prices of 1998. Recent relatively high producer returns are expected to unleash a surge of milk production sufficient to overtake projected milk demand and drop milk prices sharply. However, the timing of these developments is highly uncertain. The full brunt of the production expansion is projected to arrive in 2000, although an earlier appearance is a distinct possibility.

A number of cross-currents affected 1998 milk production. Concentrate feed prices began the year somewhat high but fell considerably as the year progressed. Weather effects were quite adverse in some regions at some times but were quite favorable at other places and times. Supplies of top quality forage stayed tight but supplies of lesser quality alfalfa were large. But, the key feature of last year's milk production was the failure of output, for most of the year, to respond to high prices. Except for weather-related aberrations, milk production was essentially flat from late 1995 until the autumn of 1998.

Milk cow numbers were 1.3 percent below a year earlier in first quarter 1998. The decreases slowly diminished until cow numbers were just 0.7 percent below a year earlier in the last quarter. Moderation in cow number declines was caused by the improved level of 1996-98 returns but probably was less than might have been expected on the basis of past experience.

Milk per cow grew modestly through summer, despite milk-feed price ratios that should have encouraged aggressive concentrate feeding and above-trend increases in milk per cow. Tight supplies of prime hay undoubtedly played a role. Fourth quarter gains were sizable but, like changes in cow numbers, probably not fully consistent with the incentives produced by record milk prices.

Late 1998 production increases likely were the harbinger of things to come throughout 1999 and into 2000. The concentrate ration value is projected to fall 7 to 10 percent, following 1998's 10 percent drop. Returns over concentrate cost will be well below the very high 1998 level but probably will exceed those of any other recent year. The milk-feed price ratio probably will set a record.

Milk cow numbers at the end of 1999 are not expected to be much below current levels. Although the exit of dairy farmers may not change much, the pressure of recent returns should spur expanding producers to pick up the pace. Even without optimal forage conditions, milk per cow should post a large gain, although it may not fully catch up with trend after the sluggishness of recent years.

Expansion in milk production is projected to accelerate gradually during 1999. Output is expected to rise about 2 percent this year, with gains in milk per cow exceeding 2 percent and easily outweighing the fractional decline in cow numbers. The greatest growth in milk production is not projected to occur until late 1999 or 2000. However, the incentives to expand output have been so large that a surge in production is a possibility at any time.

Brisk economic growth and consumer willingness to spend boosted dairy product demand in 1998. Consumers bought 2 percent more dairy products on a milkfat basis and 1 percent more on a skim solids basis, even though retail dairy prices averaged 4 percent above 1997. Demand for milkfat was particularly strong with sales of butter, cream, cream cheese, and ice cream showing relatively little effect of extremely high prices. Meanwhile, cheese sales rose almost 2 percent, commercial disappearance of nonfat dry milk was about unchanged, and fluid sales slipped fractionally.

Dairy demand is expected to be fairly strong in 1999, but probably will not match that of 1998. Economic growth is projected to be strong, but consumers may not spend with such exuberance. Sales will also be affected by carry-over effects from the high wholesale prices of 1998. Some wholesale buyers probably will make purchasing adjustments based on their experiences of last year--not just current prices. At retail, current year-to-year increases in prices probably are larger than at any time in 1998. The projected increase in 1999 milk production will mean that significantly larger quantities will have to clear commercial markets this year. However, the somewhat softer demand means that they probably will do so only at lower prices.

Commercial dairy stocks at the start of 1999 were fairly moderate. Milkfat stocks were somewhat larger than a year earlier, while skim solids holdings were slightly smaller. Commercial stocks may be a key indicator this year. A quick build-up in stocks might well be an omen of a sustained period of lower prices.

International dairy markets have been mostly adrift. Export supplies have been moderate, in part because of lower output in New Zealand. However, demand softness has kept prices below a year earlier. Russia has purchased some butter but economic problems have greatly limited imports. Similarly, weaker Asian demand has held dry milk prices low. More recent economic problems in Brazil threaten to push some Argentine products elsewhere. Prospects for substantive improvements in 1999 international dairy markets seem dim.

Exports under the Dairy Export Incentive Program (DEIP) will be large in 1999, but there will be a hiatus in new contracts for nonfat dry milk caused by exhausting some key allocations before midyear. In addition, the shrinking amounts allowed under WTO mean that DEIP cannot absorb a large surplus. Sizable purchases of nonfat dry milk are expected to continue in 1999 (the last year of the price support purchase program). Some tightening in markets for separated skim solids may keep purchases somewhat smaller than last year.

Wholesale prices of cheese and butter have been on a rollercoaster ride that may not yet be at an end. Exchange prices of cheese have recovered modestly after January's 65-cent plunge, evidently a correction to an over-reaction and very similar to the earlier pattern of butter prices. Cheese prices may edge somewhat higher before seasonally rising milk production erodes them

this spring. Butter prices may stay unsettled. The relative values of milk for cheese and butter-powder may reverse a number of times, and prospects for the seasonally tight second half of the year may be particularly uncertain.

Farm milk prices are expected to regain some stability by late spring-early summer--but at levels much below the second half of 1998 or the start of 1999. The expansion in milk production has begun to overcome dairy demand increases, bringing about a price readjustment. However, the flush season price low is not expected to be extreme. Demand strength is projected to keep spring prices well above 1997 averages. A moderate seasonal increase in milk prices is expected during the second half of the year. For all of 1999, farm milk prices are projected to be about \$14.00 to \$14.75 per cwt, down about \$1 from the 1998 record but still much higher than most of the nineties.

A faster-than-expected expansion in milk output would, of course, reduce 1999 milk prices. However, general strength of early 1999 prices, the recovery of wholesale prices after the initial crashes, the absence of rapid build-ups in commercial stocks, and quite modest price support purchases of powder suggest that substantial market strength persists. Rapid growth in milk output under these conditions probably would have more effect in nullifying second-half seasonal increases than in pushing spring prices to very low levels.

Retail dairy product prices are expected to reach a peak during the first half of 1999 and then decline slightly or hold about steady during the second half. Compared with a year earlier, retail prices probably will be 6 to 7 percent higher during the first half, with the increases diminishing substantially in the second. The farm-retail price spread is expected to grow considerably after the 4-percent decrease in 1998.

The general pattern of a slowly growing dairy industry remains the long-term outlook. Generally favorable milk-feed price ratios will help milk per cow expand about 2 percent per year, with the assistance of genetic and management improvements, structural shifts, and bovine somatotropin. Large numbers of dairy farmers will continue to leave dairying. But, construction of new or dramatically expanded dairy farms is expected to hold declines in milk cow numbers to 1 percent or less in most years.

Demand is expected to trend slowly higher. Gains in cheese sales and in use of dairy products in processed foods are projected to outweigh losses in other dairy sales. The contribution of dairy products to the sensory appeal of many prepared foods lends strength, even though most of the basic dairy products operate in mature markets.

A general tendency for supply to grow slightly faster than demand is expected to result in a slight erosion in real milk prices. However, the relatively equal growth rates and the demise of the price support purchase program imply that year-to-year price changes may vary greatly. Feed conditions, changes in the general economy or international markets, weather, or structural variability could move prices sharply in either direction.

The experiences of recent years have brought some common presumptions about dairy demand into question. Clearly, last year's butter prices made it very difficult to believe the rumors of the death of milkfat demand. It is true that there has been a very gradual shift of market value from

milkfat to skim solids. However, the true trend has always been dwarfed by shorter-run swings in milkfat or skim solids demand. The 1996-98 period, like the mid-eighties, had very strong demand for milkfat while skim solids demand was sluggish, while the intervening years were dramatically different. A sudden cessation in these swings in relative demand seems highly unlikely.

The popular image of dairy product demand is a consumer standing in front of a supermarket dairy case filling a shopping cart. Except for fluid milk, dairy demand is more commonly represented by a wholesale buyer buying ingredients for some type of food preparation, whether in a restaurant, industrial food plant, or even a supermarket itself. Dairy demand has undoubtedly been changed by the growth in the food preparation business--although the direction of some of these changes is quite unclear.

There is some tendency for ingredients in high value-added uses to be less price-responsive at wholesale than the wholesale demand by retailers. However, commercial food preparers have substitution alternatives that are not available to home preparers. Given the uncertainties about even the direction of change, re-estimation of wholesale price responsiveness would seem to be quite important for understanding dairy markets.

Very large individual buyers for commercial food preparation have become common. These buyers typically are not content with generic bulk commodities from the spot markets but insist on special specifications or services. The growing importance of such buyers has had the side effect of diminishing the amount available for trading in the traditional price discovery markets. Some of the recent price volatility may be attributable to the probably irreversible trend toward thin spot markets.

The emergence of a large food preparation industry has lengthened the time between price changes and full response to those changes. Food processors incur substantial cost to reformulate products and change labels. They also tend to be cautious about introducing product changes that may affect flavor or consumer acceptance and to cushion the immediate effect of changes in ingredient costs on prices of their products.

Retail consumers also may be responding more slowly to price changes. For most consumers, purchase of basic foodstuffs now requires an extremely small share of their income. They probably are less aware of price changes and have no compelling reason to alter purchases quickly.

The record wholesale prices of the second half of 1998 did not produce any significant immediate response in product movement. Similarly, the very low butter prices of the early nineties took several years to generate full response, as did the fairly high nonfat dry milk prices of the mid-nineties. Whether or not the ultimate size of the adjustment to prices has changed, the adjustments definitely seem to develop more slowly, a significant contributor to increased price volatility.

The sluggishness of the production response to the much higher returns of 1996-98 was a bit surprising, particularly to those with memories of the dairy industry of the eighties. Part of the answer probably lies in the greater maturity of the Western dairy industry. The West cannot now

easily post the same rapid growth because of the current hindrances of more limited alfalfa supplies, budding environmental problems, and fewer promising areas for new dairy development.

In the rest of the country, dairy farms may be more distinctly separated into two types than has been the case for several decades. Traditionally organized farms have been under long-term income stress and have been exiting at rates reminiscent of the late sixties and early seventies. Most of the partially offsetting herd expansions have come from new "industrial" operations or operators making the leap from traditional farms to such larger operations using highly specialized labor. In contrast, dairy farm growth during the late seventies and eighties tended to be more widespread but in more modest increments and with fewer changes in basic organization.

Development of "new style" Northern dairy farms has not been as rapid as expected. In particular, the relatively high returns of the last few years have yet to accelerate producer expansion plans appreciably. The change from managing cows to managing people is both daunting and highly risky for many dairy farmers. Once plans are carefully thought out and set, they may become very conservative about any alteration.



Dairy Expansion

“The Reason, the Process”

Agricultural Outlook Forum 1999
Arlington, VA
February 23, 1999

Steve Watrin
Director, Dairy Development
Land O'Lakes, Inc.



Dairy Expansion

“The Reason, the Process”

- National Industry Changes
- Regional Industry Changes
- Dairy Development



National Industry Changes

- Elimination of Price Support
 - Price Volatility
 - Greater Profit Potential
 - Greater Transition



National Industry Changes

- Knowledge and Technology
 - Productivity
 - Profitability
 - Specialization



Regional Industry Changes

- Lifestyle Expectations
 - Quality of Life
 - Profit
 - Retooling



Regional Industry Changes

- Understanding the Value of Cows
 - Non-Dairy Entrants
 - Economic Development
 - Movement of Western Dairymen



Advantages of Midwest Dairy

- Inexpensive Land
- Excess Forage
- Low Grain Prices
- Abundant Water
- Abundant Land for Nutrient Management
- Good Weather for Cows
- High Milk Prices



DAIRY DEVELOPMENT

Mission

Provide producers with professional business support services to improve their profitability and national competitiveness.



DAIRY DEVELOPMENT

Key Program Concepts

- Provide support in facility design, technology, finance and business economics.
- Provide quality business planning and project management services for dairy producers
- Provide a personal and family goal-driven process
- Proactively coordinate resources
- Extend and compliment existing internal/external support services



DAIRY DEVELOPMENT

History

- Pilot program initiated in 1989
- 1990 Implemented program
- 146 Producer projects through 1998
- Range 150-1500 cows
- Average -- 550

DAIRY DEVELOPMENT

Program Process

Stage 1	<u>Initial Planning & Design</u>
Phase I	Strategic Planning
Phase II	Operational Planning
Phase III	Site Development & Final Design
Stage 2	<u>Bid Securement & Construction</u>
Phase IV	Bid & Loan Securement
Phase V	Construction
Stage 3	<u>Implementation & Monitoring</u>
Phase VI	Management Implementation
Phase VII	Consultation & Monitoring of business performance

DAIRY DEVELOPMENT

Phase I Planning

Actions

- Defining personal and business objectives
- Outline potential models.
- Study existing dairies.
- Evaluate financial capabilities.



DAIRY DEVELOPMENT

Phase I Planning

Outcomes

- Strategic Plan
 - Focus
 - Direction
- Profit Analysis
- Clarify Expectations
 - Communications



DAIRY DEVELOPMENT

Phase II Planning

Actions

Develop Operational Plan

- Technology Planning
- Animal Planning
- Labor Planning
- Manure Storage / Nutrient Use
- Feed Planning
- Facility Planning
- Equipment Plan



DAIRY DEVELOPMENT

Phase II Planning

Outcomes

Complete Business Plan

- Strategic Plan
- Expansion Budget
- Feed Plan Model
- Animal Flow Model
- Labor Model
- Manure Nutrient Model
- Financial Proforma



DAIRY DEVELOPMENT

Phase III Planning

Actions

- Survey, Borings, Testing
- Manure Storage Design and Permit Application
- Logistical Planning



DAIRY DEVELOPMENT

Phase III Planning

Outcomes

- Site Plan
- Manure Management Plan
- Facility Plans and Blueprints



DAIRY DEVELOPMENT

Phase IV Bid Securement

Actions

- Develop bid proposals
- Secure bids
- Analyze bids
- Update financials



DAIRY DEVELOPMENT

Phase IV Bid Securement

Outcomes

- Secure Permits
- Secure Contractors
- Secure Financing
- Establish Timelines



DAIRY DEVELOPMENT

Phase V Construction

Actions

- Review Project Protocol
- Weekly Project Visits
- Update Project Tracker
- Review Change Orders
- Consult on Feed, Labor, Animal, Record implementation process



DAIRY DEVELOPMENT

Phase V Construction

Outcomes

- Project on budget
- Construction per design
- Implement new record system
- Implement labor plan
- Secure forage supply
- Implement animal expansion



DAIRY DEVELOPMENT

Phase VI Implementation

Actions

- Establish herd management
calving, care, culling, milking, feeding,
breeding
- Labor Training
activity flows, s.o.p.
- Implement process & controls
anticipate issues, propose options, measure
results, follow-through on adjustments.



DAIRY DEVELOPMENT

Phase VI Implementation

Outcomes

- Performance to Budget
- Management of Business
 - People, Cows, Money Monitoring,
 - System Updates & Plans
 - Financial
 - Production
 - Labor
- Business Analysis & Budgeting



Factors Impacting Dairy Expansions

- Building Ordinances
- Permitting Requirements
- Increasing Cost for Assets
- Lending Requirements



Dairy Expansion Summary

- National Impacts
- Regional Impacts
- Process for Success
- Resources

CHART A

Number of Dairy Operations by Size Group in U.S.

<u>Year</u>	<u>1-29 Head</u>	<u>30-49 Head</u>	<u>50-99 Head</u>	<u>100-299 Head</u>	<u>200 + Head</u>	<u>Total</u>
1993	59,250	35,390	42,920	14,900	6,990	159,450
1994	53,300	32,760	41,130	14,680	6,820	148,720
1995	46,400	30,710	38,440	14,570	6,910	137,030
1996	39,780	28,410	36,930	14,740	6,940	126,800
1997	33,420	26,300	34,810	14,900	7,250	116,680
93-97 change	-25,830	-9,090	-8,110	---	+260	-42,770
93-97% change	-43.6%	-25.7%	-18.9%	---	+3.7%	-26.8%

CHART B

Number of Dairy Operations by Size Group in U.S.

<u>Year</u>	<u>1-29 Head</u>	<u>30-49 Head</u>	<u>50-99 Head</u>	<u>100-299 Head</u>	<u>200 + Head</u>	<u>Total</u>
1993	4.1	13.1	27.6	18.9	36.3	100.0
1994	3.4	12.0	26.0	19.2	39.4	100.0
1995	3.1	11.3	26.1	19.8	39.7	100.0
1996	2.7	10.2	24.8	20.0	42.3	100.0
1997	2.4	9.5	23.4	20.0	44.7	100.0
93-97 change	-1.7	-3.6	-4.2	+1.1	+8.4	

CHART C

**Costs and Returns of Milk Production on FCRS Farms with
Alternative Sizes of Dairy Operations, Per Cow 1993**

	<u>Fewer than 60 Cows</u>	<u>60-119 Milk Cows</u>	<u>120-299 Milk Cows</u>	<u>300 + Milk Cows</u>
Gross Return	\$2,092	\$2,143	\$2,355	\$2,319
Variable Cash Expenses	1,629	1,735	1,724	1,668
Overhead Expenses	<u>658</u>	<u>577</u>	<u>519</u>	<u>446</u>
Residual Return to Labor, Management And Risk	\$(195)	\$(169)	\$112	\$205
Ave. No. of Cows	34	78	166	818
Net Return to the Milk Cow Enterprise	\$(6,630)	\$(13,182)	\$12,544	\$167,690

CHART D

Minnesota Statewide Farm Business Management Records – 1997

	<u>Milk Cow Enterprise – Per Cow</u>		
	<u>Ave. for All Farms</u>	<u>Ave. for Low 20%</u>	<u>Ave. for High 20%</u>
No. of Farms	688	138	138
Gross Return	\$2,220	\$1,722	\$2,647
Total Direct Expenses	685	152	1,131
Total Overhead Expenses	<u>420</u>	<u>342</u>	<u>503</u>
Residual Return to Labor Management and Risk	\$264	-\$190	\$629
Ave. No. of Cows	67.3	58.0	80.1
Net Return to the Milk Cow Enterprise	\$17,767	\$(11,020)	\$50,383

CHART E

Impact of Herd Size on Value Added

Expressed on a per cow basis

	<u>HERD SIZE</u>			
	<u>Fewer than 60 milk cows</u>	<u>60 - 119 milk cows</u>	<u>120 - 299 milk cows</u>	<u>300 or more milk cows</u>
Hired Labor	\$39.22	\$110.25	\$152.58	\$138.30
Interest Paid	117.54	110.12	122.53	97.95
Imputed returns to Unpaid family labor & family owned capital	458.04	239.07	112.31	47.21
Imputed land rent	1.39	.85	.66	.56
Residual Return to Management & Risk	<u>(609.54)</u>	<u>(371.86)</u>	<u>9.21</u>	<u>180.51</u>
Value Added	\$6.65	\$88.43	\$397.31	\$464.53

Introductory Remarks: Prospects for China: Importer or Competitor?

James W. Schroeder

Deputy Under Secretary for Farm and Foreign Agricultural Services, USDA

Good Afternoon. I am Jim Schroeder, Deputy Under Secretary for Farm and Foreign Agricultural Services at USDA. I will be the moderator this session, which has been provocatively titled "Prospects for China: Importer or Competitor?"

So, if you thought you were in the biotechnology session or maybe the one on precision agriculture, this would be a good time to check your program and change rooms.

For me personally, the timing of this session could not have been better. I am getting ready to visit China early next month, so today I will have an excellent opportunity to do some trip preparation "homework." But all of us in this room have a very special interest in China. How could it be otherwise, when our two-way trade in agricultural, fish, and forest products last year (FY 1998) reached almost \$5 billion. China is an important and valued customer for American agriculture. And we look forward to even stronger trading relationships in the future.

With the world's largest population, rising incomes, and a culture that emphasizes good eating, China offers tremendous potential for expanding U.S. farm exports. In 1998, China became the fifth largest market in the world for U.S. farm products. Even so, there are still some restrictive trade policies that we are working to try to get China to eliminate and negotiating a successful WTO accession agreement with China remains a high priority for U.S. agriculture.

Today we have a special opportunity to hear from three people who are uniquely qualified to discuss China's agricultural prospects. I'd like to introduce each of our panelists before we begin. Then each will make his presentation and we should have plenty of time for questions after that.

But as our first order of business, let's extend a warm welcome to our panelists, who have traveled so far to be with us today: Dr. Scott Rozelle, Mr. Zhu Xiangdong, and Mr. Yaoliang Min.

Our first speaker will be Dr. Scott Rozelle. Dr. Rozelle is an associate professor at the University of California, Davis. He is in the Department of Agricultural and Resource Economics and is recognized as one of our country's leading experts on China's agricultural sector. He chairs both the American Agricultural Economics Association's Committee on Relations with China and the International Advisory Committee of the Center for Chinese Agricultural Policy. He is also a national fellow of the Hoover Institute.

Dr. Rozelle will be presenting a paper that he authored with Huang Jikun (Who-ong Gee-quin), Director of the Center for Chinese Agricultural Policy at the Chinese Academy of Agricultural Sciences. His paper examines supply, demand and trade of agricultural commodities

in China; marketing opportunities; and world trade competition. He looks at a number of key economic, technological, and social forces; voices some concerns about potential impacts of China's rapid economic and social transformation on global markets and institutions; and provides a model that can be used to assess future growth of China's food supply and demand balances, particularly in the grains sector.

Thank you Dr. Rozelle. You've not only given us a comprehensive look at what we might expect in China's grain sector, but you have provided an analytical framework to guide us in the future, as we try to keep pace with a rapidly changing situation.

Next, I would like to introduce Mr. Zhu, who is the Director General of China's Organization of Rural Socio-Economic Survey, State Statistical Bureau. I want to extend special thanks to Mr. Zhu for traveling so far to be part of our conference today. Mr. Zhu has worked closely with a number of economists at USDA in a cooperative research project that contributed to the first-ever agricultural census in China in 1997. This was a tremendous undertaking and one that has provided invaluable information.

I would like to introduce Mr. Yaoliang Min. Mr. Min is Director General of the Market and Economic Information Department of the Ministry of Agriculture. I want to extend our special appreciation to you, also, for traveling so far to be with us today. Mr. Min will be providing us with a vital piece of the puzzle as we look at future prospects for China. Our discussion would be incomplete without the Ministry of Agriculture's perspective.

Thank you, Mr. Min, for giving us the Agriculture Ministry's assessment of the situation. We look forward to working with you on agricultural issues in the future.

Now that we have heard from our three experts, I'd like to open the floor to questions from the audience. When you ask your question, please let us know which panelist you are directing it to.

**Supply, Demand and Trade of Agricultural Commodities in China
Marketing Opportunities; World Trade Competition**

Scott Rozelle, Associate Professor

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and

Jikun Huang, Director

Center for Chinese Agricultural Policy, Chinese Academy of Agricultural Sciences

China's emergence as the world's fastest growing economy has both raised hopes that East Asia's giant can join the ranks of modernizing nations and fueled concerns that its rapid transition will upset the fragile equilibria of global markets and institutions. The nexus of China's growth, the management of its food economy, and its potential impact on world agricultural product markets compellingly illustrates the delicate balance facing policymakers. Directed properly, China's growth provides an unprecedented opportunity for achieving major gains in food security, poverty reduction, and nutritional improvement inside China. Without suitable policies, China's development may wreak havoc on sectors of its own society as well as the rest of the world.

Unfortunately, China's leadership and the international community have limited scope for understanding future trends, evaluating socio-economic tradeoffs, and sorting through policy options. Current analytical tools are quite simple, having almost no structural basis and providing little policy guidance. Predictions have been notoriously sensitive to fundamental assumptions, creating such a wide range of forecasts that policy makers have not become enlightened, but have felt defenseless when confronted with assertions on future supply, demand, and trade balances. The shallowness of understanding was exposed by the outrageous pronouncements by Brown, when he projected, without any research-based underpinnings, massive food shortfalls in China by 2030.¹ The ensuing panic in China's agricultural hierarchy, however, could not be suppressed since no research team inside or outside of China could respond authoritatively.

Predictive frameworks are not easy to construct. China is a country experiencing rapid economic and social transformation. Industrialization proceeds at one of the fastest rates in the world. These forces are causing wrenching changes: market development, urbanization, environmental degradation, and budgetary stress. These factors should be expected to have as great, if not greater, impact on supply and demand than traditional determinants such as income growth and price movements. Dealing with the challenges of managing their food sector in such a rapidly changing environment requires that China's leaders have a clear understanding of the structure of the economy, especially how supply, demand and trade are affected by any number of key economic, technological, and social forces.

The goal of this paper is to help establish a more comprehensive, transparent, and empirically sound basis for assessing the future growth of China's food supply and demand

balances. We hope this paper helps shed light on the debate on China's future grain balance, identifies the kinds of structural transformations and policy decisions which might cause huge grain deficits, and shows the circumstances under which China might maintain its current status as near self sufficient.

To meet this goal, the paper first examines China's current grain balance sheet and history of grain imports, and reviews previous efforts to project China's growth of grain supply, demand, and trade. Our own assessment of the future grain economy begins by investigating a series of factors, beyond income and prices, which may affect grain demand and supply. We develop a supply and demand projections model, which includes a series of important structural factors and policy variables, including urbanization and market development on the demand side, and technology, agricultural investment, environmental trends, and institutional innovations on the supply side. After reviewing the baseline assumptions, the results of the baseline projections are presented, and alternative scenarios are examined using different rates of growth in income, prices, and wages, population, and investment in research and irrigation.

Although we limit our analysis to grain, some of the projections may be surprising. Even in this fairly homogeneous sector of China's food economy, the socio-economic forces act very differently on rice, wheat, and maize, the study's three major crops. Not only does migration, technological change, income growth, and other trends have important impacts on the future supply and demand of the commodities, under a completely reasonable set of assumptions, we can show how there could be a complete reversal in historic global trade patterns for all three grains. Whereas since 1980 China has been a net exporter of rice and maize and the world's largest importer of wheat, under our baseline scenario, we show that China could import rice and maize in the 21st century, and satisfy its own demand for wheat.

Annual Grain Production and Utilization in China

Total grain production (in trade weight) rose to 403 million metric tons (mmt) in 1993-1995 (Table 1). After decline 2 mmt in stocks (which increase current grain supply), and importing 2 mmt of grain, the total annual supply of grain during this period was 407 mmt. This supply was used to meet a number of needs: seed, animal feed, nonfood manufacturing, and direct consumption for food. Grain used for direct food consumption took up the greatest part of total supply, about 65 percent in 1993-95. Animal feed accounted for 23 percent of utilization. On a per capita basis, the average resident in China consumed 222 kilograms in a year of grain, a level quite high even in comparison to the rest of East Asia. In contrast, meat and fish consumption are relatively low. The feed supply helped provide the average resident with about 30 kilograms of meat, poultry, and fish product.

Aggregate grain balances disguise different patterns of rice, wheat, and maize utilization in terms of the use for feed and food and rural-urban dietary habits (Table 1, rows 2 to 5). China's residents consume most of the nation's rice (85 percent) and wheat (91 percent) directly as food grain. The livestock sector uses most of maize (84 percent) for feed.

Even general consumption aggregates vary by sector of the economy. Urbanites eat far less rice (68 kilograms) and more meat and poultry (34 kilograms) than their rural counterparts

(103 and 20 kilograms, respectively--Table 1, rows 7 to 9). Wheat is more complex. Unlike the rest of East and Southeast Asia, China has a large wheat economy and its per capita *rural* consumption of wheat exceeds urban intake. Although there are sharp regional variations, the average rural resident consumes 90 kilograms per year of wheat versus only 72 kilograms for those in cities and towns. Commodity and sectoral differences in demand patterns become important in deriving future balances, since economic forces and structural changes affect each consumer group differently as well as the size and composition of the groups themselves.

The waxing and waning of supply and demand in the past several decades has caused imports and exports to rise and fall (Table 2). When China began its reform program in 1978, policy makers decided to allow a general increase in imports to relieve the constrained demand of consumers. Several years after import restrictions on wheat and other grains were relaxed, imports grew to nearly 15 mmt (row 2). Rapid growth of grain yields in the early 1980s reversed these trends, and by 1985 China became a net exporter. With continued demand growth in the mid-1980s, poor harvests drove net imports back up to more than 10 mmt by 1989. Soft demand and a resurgence of agricultural growth allowed imports to fall once again to the point where China was nearly self sufficient in overall grain in the early 1990s.² In the mid 1990s, the cycle repeated. Net imports reached historic highs of nearly 20 MMT in 1995 but are projected to decline in 1997.

Unlike aggregate imports, trends for specific commodities have been more steady. Despite a primary reliance on domestic sources, China imported more wheat than any other country in the world since the mid-1980s. Averaging 10 mmt of wheat per year means China accounts for 10 to 15 percent of world trade (Table 2, row 2). In contrast, except for 1995 and 1996 (and 1989 for rice), China has exported maize and rice (rows 3 and 4). By 1997, the recent trade patterns have returned. International traders forecast China will export more than 5 mmt of maize in 1997 and will dominate the northeast Asia maize export markets at least through.³

Alternative Projections of Grain Demand and Supply in China

Various attempts at projecting future trends in China's grain imports and exports have been published or are currently being used and periodically updated.⁴ The most striking feature of the projections of grain surpluses and deficits is their wide range. At one extreme, China is predicted to become a net exporter of grain. CAAS forecasts that China will have the capacity to export 47 mmt in the year 2000.⁵ Chen and Buckwell construct a scenario where they argue China can move from being an importer of about 10 mmt in the mid-1980s to a net exporter of 17 mmt in 2000.⁶

Other analysts believe China will eventually become a net importer of grain, some believing imports will rise gradually, others more sharply. The medium-term forecasts of the Economic Research Service of the United States Department of Agriculture (henceforth ERS) predict China will be a moderate importer through 2005.⁷ Anderson, et al. predict China's grain imports will rise to 33 mmt in the early 21st century.⁸

In contrast, another set of researchers predict China's grain imports will increase significantly. Other than Brown, who predicts imports could exceed 350 MMT by 2030, Garnaut

and Ma project that at per capita income growth rates of 6 to 7.2 percent (rates under those experienced between 1992 and 1994), China will require imports of between 50 to 90 mmt by 2000.⁹ Carter and Zhong predict that consumption will outpace production, leaving a food balance deficit of more than 100 mmt by 2000.¹⁰ Chen and Buckwell arrive at a high-growth scenario where China imports 59 mmt by 2000.¹¹

Since all analysts are essentially forecasting from the same general base period, the predicted changes in the *relative* rates of growth of grain supply and demand lead the differences in expected grain balances.¹² Brown projects actual declines in grain production of 0.6 per cent per year (or a 20 percent decline by 2030), most of which comes from a nearly 50 percent fall in sown area.¹³ Carter and Zhong project zero growth in production, while all other estimates of grain production growth are positive, ranging from 1.1 per cent to 1.8 per cent for baseline or slow growth scenarios, and to 2.9 per cent for rapid growth scenarios.¹⁴

Variation in demand projections is similar. Several projections of demand growth are in the range of 1.0 to 1.7 percent per year, but demand growth rates well in excess of 2 percent are projected by Garnaut and Ma and Chen and Buckwell.¹⁵ The long term predictions from ERS predicts much higher cereal imports, a number of the alternative scenarios forecasting food balance shortfalls of 100 mmt.¹⁶ Given the significant variation in both supply and demand projections, it is not surprising that projected net imports are widely differing. The largest import projections result from highly pessimistic supply projections (Brown; Carter and Zhong), and high-side demand projections (Garnaut and Ma; ERS).¹⁷

Projections by commodities are much less common. Fan, Cramer, and Wailes predict that rice exports will continue, mainly due to their assumption that demand elasticities will continue to be positive and rice production growth will continue at current levels.¹⁸ Unpublished projections by Fan and Agcaoili and recent long range projections by the ERS forecast rising imports for wheat.¹⁹ Their estimates, however, do not take into consideration many of the structural changes facing China's food economy.

The most difficult part of evaluating current projections results is that the sources of the parameters of the forecasting models, and forces behind the changes in important state variables (e.g., population and income growth), are not transparent. The parameters on which all of these grain projections are based (except Carter and Zhong; and Fan, Cramer, and Wailes) are either partly or wholly synthetic.²⁰ There also is little scope for assessing the impact of policy variables. With the exception of the ERS and Fan and Agcaoili models, no other model can be used to systematically assess the effect of policy tools that are under the control of government. Fundamental forces in the economy, such as urbanization and market development, are ignored. Given the rapid structural change in China's economy-in-transition and the importance of policy in China, the omission of such important variables reduces the robustness of predictions from currently available models.

Structural Change and Government Intervention in China's Agriculture

As China's economy continues to change and grow, one of the main questions facing policy makers is how future patterns of utilization can most effectively be met. China is a country

in rapid transition from a socialist system to one where an increasing proportion of its goods and services, including food, are being allocated by market forces.²¹ It also is a country that is rapidly developing. There are many forces arising from these development and transition processes that will affect China's food economy. Any attempt to accurately forecast food future supply and demand trends must account for these major economic forces.

Demand Shifters: Income, Market Development, and Urbanization

On the demand side, recent changes in the urban economy have made urban consumers almost entirely dependent on markets for their consumption needs.²² In this sector, prices and income changes most likely will be the fundamental force driving consumption pattern changes. Real income per capita for urban residents has risen rapidly in recent years, jumping an average of more than 5 percent annually between 1985 and 1995. At the current average level of income for most urban residents rice and wheat consumption rises very little with new increments in income; meat consumption, on the other hand, is still very much influenced by income changes.²³

Rural residents live in a different environment than their urban counterparts, and exhibit different demand behavior. While rural incomes have grown more slowly since the mid-1980s, demand for food grains and meat products have still increased as incomes have risen.²⁴ The average rural consumer, however, will spend less of their additional income on rice, wheat, and other staple food grains as they become richer during the development process.

Rural consumption markets also are less complete, but as transition improves the market environment, dietary habits may change. Farmers in many areas face limited choices in their consumption decisions since many of the products they desire on a daily basis, such as meat and fresh fruit, are not always available, even as their incomes rise. In a sample of households drawn from the national household income and expenditure survey by the authors, a strong and significant correlation was found between the level of consumption of primarily purchased goods, such as meat and fruit, and the level of market development, holding income and prices constant.²⁵ Discontinuous free markets, lack of refrigeration, and generally high transaction costs for procuring food in rural areas affect rural consumption patterns in China. Even with rapid changes in rural markets, in 1992 China's farmers still purchased only 46 percent of their food. As markets develop, and activity on rural consumption markets increases, apart from changes in income and prices, consumption patterns will be affected.

Across Asia, as countries urbanize the behavior of consumers changes dramatically.²⁶ Urban dwellers consume less rice and demand higher levels of meats, milk products, and fish than their rural counterparts, even after accounting for the differences in income and prices. The ratio of urban to rural residents in China is changing fast. The urban population has grown from 19 percent of total population in 1980 to 28 percent in 1992. The impacts of this population shift on consumption in China have been documented.²⁷ While structural transformations of the economy should be accounted for in any predictions of future consumption patterns, few projections explicitly consider the differences in the consumption between rural and urban consumers.

The case of wheat may unfold in an unexpected pattern in China when compared to its Asian neighbors, although the dietary changes from migration will differ depending on what part

of the country one is examining. Other countries in East and Southeast Asia always have experienced rising wheat demand with migration, since farmers in these countries produce and consume few wheat products.²⁸ Migrants from southern rice-producing areas may be expected to follow this path since their current production and consumption patterns resemble those in neighboring countries. In contrast, city-bound migrants from north China consume very high levels of wheat, about 200 kilograms per capita in many northern province, levels that exceed or approach those of traditional wheat-producing, bread-eating nations, such as Pakistan, Turkey and Egypt. North China migrants will cut their consumption of wheat dramatically as they adopt the dietary patterns of urban dwellers. Since the nation's average rural consumption level exceeds that of urban areas (Table 1), if the same magnitude of migration occurs in both North and South, China's future migration most likely will have a dampening net effect on wheat demand, unlike its other urbanizing Asian neighbors.²⁹

Supply Shifters: Technology, Investment, and Environmental Stress

On the supply side, many sharp transitions are also underway. Above all, technological change needs to be considered explicitly, since it has been the engine of China's agricultural economy.³⁰ China's technological base grew rapidly during both the pre-reform and reform periods. For example, hybrid rice, a breakthrough pioneered by Chinese rice scientists in the 1970s, increased yields significantly in many parts of the country, and rapidly spread to nearly one-half of China's rice area by 1990.³¹ Wheat and maize enjoyed similar technological transformations.³² China's robust growth in the stock of research capital has been significantly responsible for these dramatic changes. Recent work has shown that the contribution of technology to crop growth equaled or exceeded that of the Household Responsibility System in the early reform period. Technological change contributed almost all crop growth in the late 1980s and early 1990s.³³

There is concern, however, that China's system maybe suffering from neglect after more than a decade of reform.³⁴ Real annual expenditures on agricultural research fell between 1985 and 1990, before resuming real growth in 1990.³⁵ The slowdown in growth in annual investments in the late 1980s will result in slower growth in the overall stock of research in the 1990s and may affect production.

Historic patterns of research spending and China's investment plans affect how supply of rice, wheat, and maize will respond to research expenditures in the future. Agricultural planners have traditionally invested most heavily in rice, wheat, and maize research.³⁶ Technological breakthroughs and greater extension efforts in rice and wheat have pushed yields closer to their frontiers than in the case of maize. Interviews with breeders from multinational seed corporations commonly reveal that the yield potential in all crops still exists, including rice and wheat, but that it is higher in maize.

A number of other factors similarly will affect future supply. Investment in agricultural infrastructure, especially irrigation, is another important determinant of China's agricultural growth in recent decades.³⁷ Irrigation investment and the stock of facilities have followed patterns similar to those for research, falling in the early reform period before recovering in recent years. Trends in environmental degradation, including erosion, salinization, and loss of cultivated

land show that there may be considerable stress being put on the agricultural land base.³⁸ Erosion and salinization have increased since the 1970s, although in a somewhat erratic pattern, and these factors have affected output of rice, wheat, maize, and other agricultural products.³⁹

A Framework for Forecasting China's Grain Supply and Demand

The major components of this paper's forecasting framework include a supply model for the rice, wheat, maize, other grain, and cash cropping sectors of the agricultural economy, and demand models specified separately for rural and urban consumers for rice, wheat, other grain, and 6 other animal products. Real world price projections are generated by IMPACT, a partial equilibrium global trade model developed by Rosegrant, Agcaoili, and Perez.⁴⁰

Grain supply is assumed to respond to the crop's own-price, prices of other crops, quasi-fixed inputs, and the off-farm wage. Output also is a function of the stock of agricultural research, the stock of irrigation infrastructure, and three environmental factors--erosion, salinization, and the breakdown of the local environment.⁴¹ The full set of results and detailed discussion of the model can be found in Huang, Rosegrant, and Rozelle.⁴²

Grain Demand

Grain consumption is divided into two parts: grain that is directly consumed for food and that which is fed to animals and consumed indirectly. Direct food equations are divided into rice, wheat, and other grains.

Food Grain Demand. Rural and urban food grain demand are modeled separately for several reasons. Consumption patterns are inherently different between rural and urban consumers.⁴³ Income differentials, expenditure growth, and rates of change of population, and other demographic factors also vary dramatically between rural and urban regions. The effect of urbanization is accounted for by multiplying per capita grain projections for each sector by the projected changes in rural and urban populations, including the anticipated flows of rural residents into the cities.

Econometrically estimated parameters also are used for this part of the analysis. Using an Almost Ideal Demand System framework and household survey data, the authors estimated the demand parameters.⁴⁴ The estimated coefficients and elasticities are discussed in detail in two articles by Huang and Rozelle, and one by Huang and Bouis.⁴⁵ Expenditure elasticities are estimated so that they may vary according to the level of income. As projected incomes rise throughout the projection period, income elasticities fall. Urban food grain income elasticities become zero in 2000 and turn negative in 2010; those for rural residents become zero in 2010.

Feed Grain Demand. Indirect grain consumption is imputed from the underlying demand equations for pork, beef and mutton, chicken, fish, eggs, and milk. Demand parameters for the products are estimated for rural and urban residents.⁴⁶ Different sets of parameters are estimated for different types of cities. These estimates are used for the first 10 years of the projection period. Following the experience of the rest of Asia, it is assumed that after 10 years the income-demand relationship for meat by rural residents will be similar to the current expenditure pattern

of small town residents. Similarly, during the first decade of next century, demand patterns of urban consumers in small- and medium-sized cities will become more like those of consumers in super cities in the 1990s.

Once the demand for meat and other animal products are known, the implied feed demand (and hence the overall demand for grain) is calculated by applying a set of feed conversion ratios.⁴⁷ The feeding efficiency of hogs is expected to increase slightly over time. Meat production is assumed to be produced in China, and to be sufficient to satisfy the demand for animal products, an assumption that is relaxed later in the analysis.

Baseline Assumptions

All simulations begin from the year of 1993-1995, the base period. Base period data on production and utilization (discussed above) are three year averages centered on 1994. Summaries of demand and supply factors which potentially affect the future development of China's food situation are in Appendices 1 and 2. A complete detailing of the structural elasticities and projected demographic structure of the economy can be found in Huang, Rozelle, and Rosegrant.⁴⁸

Demand Side Assumptions

Income growth and population growth will remain an important determinant of food balance in the future. Population growth peaked in China in the late 1960s and early 1970s. Since then, fertility rates and the natural rate of population growth have begun to fall. Relying on the United Nation's demographic predictions, the growth rate during 1995-2000, is assumed to be 1.055 percent per annum. This annual rate falls during the next two decades to 0.740 and 0.649 percent, a level that is considerably under the world's projected growth rate (about 1.70 percent), but above recent projections by China's demographers.⁴⁹ The shares of urban population will raise from 28 percent in the base year to 31 percent by 2000 and to 45 percent in 2020.

Baseline per capita income growth rate is forecast to average about 3 percent in the rural sector and 3.5 percent in the urban sector. The recent growth rates in the late 1980s and early 1990s were substantially above this level in the urban economy (around 6-7 percent), and significantly below this in rural areas (less than 1 percent per year between 1985 and 1992). But in recent years the overheated urban growth has slowed, and since 1991, the rural economy has begun to pull out of its recession, growing at 4 percent per year. The impact of high growth rates also are simulated to check the sensitivity of the grain projections to the alternative growth assumptions. Market factors will also change over time. Price trends are projected to follow those of world prices.⁵⁰ The rate of rural market development is expected to increase at 10 percent per year.⁵¹

Supply Side Assumptions

The supply side assumptions are identical to those used in Rozelle, Huang, and Rosegrant and Huang, Rozelle, and Rosegrant and will not be repeated.⁵² Following the discussion above, supply will respond most sharply to new technology and irrigation investment. However, annual

expenditures on research declined from 1985 to 1990, and irrigation expenditures dropped from 1975 to 1985. Because of lags, these early investment dips will keep baseline projections of investment growth below historic rates in the early projection period. The recent recovery in research and irrigation investments, together with the experience of other Asian countries and China's commitment to a strong domestic grain economy, leads to the expectation that China will sustain its recent upturn in investment funding over the long run. Erosion and salinization are expected to continue to increase at a steady but slow pace.

Results of Baseline Projections

According to the analysis, per capita food grain consumption in China hit its zenith in the late 1990s. From the baseline level of 222 kilograms, food grain consumption per capita rises slightly until 2000 and falls over the remaining forecast period (Appendix 3). The average rural resident will increase food grain consumption through 2010, before reducing demand in the second decade of the next century. The ebb of per capita rural food grain demand occurs at a time when rice and wheat income elasticities, although lower than the late 1990s, are still positive. As markets develop, rural consumers have more choice, and will move away from food grains. Urban food grain consumption per capita declines over the entire projections period.

Because of the higher quality of fine grains, total rice and wheat consumption per capita will rise slightly through the year 2000 (Appendix 3). Reflecting their still positive, albeit small, income elasticities, both rural and urban consumers demand higher quantities of rice and wheat. Per capita demand for other food grains, however, falls monotonically over the projection period. Consumption per capita of all food grains is projected to be more than 5 percent lower in 2020 than current levels.

In contrast, per capita demand for red meat is forecast to rise sharply throughout the projection period (Appendix 4). China's consumers will more than double their consumption by 2020, from 19 to 43 kilograms per capita. Rural demand will grow more slowly than overall demand, but urbanization trends will shift more people into the higher-consuming urban areas (in middle 1990s an urban resident consumed about 60 percent more red meat than his/her rural counterpart). While starting from a lower level, per capita demand for poultry and fish rise proportionally more.

The projected rise in meat, poultry, fish, and other animal product demand will stimulate aggregate feed grain demand (Appendix 5). In the baseline scenario, demand for feed grain will increase to 117 mmt by 2000, and will reach 240 mmt by 2020. This growth rate implies that feed grain as a proportion of total grain utilization will move from 23 percent in 1994 to 40 percent in 2020. The process of moving from an agricultural economy which produces grain primarily for food to one which becomes increasingly animal feed-oriented typifies rapidly developing economies.⁵³

When considered with the projected population rates, the projected per capita demands for food and feed grain imply that aggregate grain demand in China will reach 449 mmt by the year 2000 (Table 3, column 1), an increase of 10 percent over the level of 1994 (407 mmt--Table 1, column 4).⁵⁴

Although per capita food demand falls in the later projection period, total grain demand continues to increase through 2020 mainly because of population growth and the increasing importance of meat, poultry, and fish in the average diet. By the end of the forecast period, aggregate grain demand will reach 600 mmt (Table 3, column 7), nearly 50 percent higher than the initial baseline demand. During this same period, rice demand will reach 147 mmt, a rate increase of only 15 percent. The declining importance of rice as the dominant commodity in China can be seen by noting its proportion of total grain demand is projected to fall from 31 percent in 1994 to approximately 24 percent in 2020. The share of wheat falls by 4 percent (from 27 to 24 percent) during the same time period.

Baseline projections of the supply of grain shows that China's producing sector gradually falls behind the increases in demand (Table 3, columns 2, 5, and 8). Aggregate grain supply will attain 429 mmt (in trade weight) by the year 2000. Of this, rice and wheat make up about 31 percent and 25 percent, or 131 mmt and 109 mmt. This projection implies a rise in grain output of only about 6.5 percent over the 1992-94 baseline, a figure below the estimates given in recent years by MOA officials who had hoped to meet its target of 455 mmt by 2000 (or 500 mmt in nontrade weight figures).⁵⁵

Production is expected to rise somewhat faster in the second and third decades of the forecast period. Mostly as a result of the resumption of investment in agricultural research during the forecast period, aggregate grain production is expected to reach 488 mmt in 2010, an increase of 14 percent during the preceding 10 years. Production will reach 569 mmt by 2020, an even higher percentage increase for the decade (16.6 percent over the 2010 level).

Under the projected baseline scenario, the gap between the forecast annual growth rate of production and demand implies a rising deficit. Total grain consumption rises at 1.48 percent per year, 0.76 percent from the rise in population and 0.72 percent due to rising per capita grain demand. Nearly all of the higher per capita grain demand is from the increased demand for feed grain (it rises by 2.89 percent while aggregate demand for food is stagnant). Grain production during this period grows only 1.35 percent annually. Imports surge to 28 mmt by 2010 and remain at a similar level through 2020 (30 mmt, Table 3, row 1).

Unlike the predictions of Fan, Wailes, and Cramer or ERS, who expect China to be a net exporter in the late 1990s, this study's results show that China will need to import moderate amounts of rice in 2000 and following years (Table 3, row 2).⁵⁶ The baseline projection shows the nation consuming 3 mmt of imported rice by the end of the current decade. In fact, China is a net rice importer in 2000 under all of the alternative assumptions. While China has been a net rice exporter in the early 1990s, recent rises in rural income have removed surplus off of the domestic market and China imported rice in 1995 and 1996.

The most surprising results of the commodity projections are those for wheat. Under the baseline scenario, the initial widening gap during the late 1990s implies a rising deficit. Wheat consumption rises at about 1.60 percent annually, while production grows only by 1.30 percent. Wheat imports rise from their recent levels of about 10 mmt per year to 13 mmt in 2000 (Table 3,

row 3). Wheat imports peak shortly thereafter, and fall back their current levels by 2010 and by 2020 fall to zero, implying that China will achieve self-sufficiency in wheat.

Several factors distinguish the wheat results from those of other studies. More than anything, falling wheat demand resulting from rural to urban migration and emerging rural consumption markets allows supply to catch up. Other studies, such as Fan and Agcaoili and ERS, which do not consider urbanization and market development forces, predict higher wheat imports.⁵⁷ Moreover, while there is considerable range in this study's projections for rice and even more for maize, few changes in assumptions result in predictions of China becoming a significantly larger wheat importer than it currently is. Most all major demand factors that appear to be inexorably increasing—urbanization, income growth (with zero or negative income demand elasticities), and market liberalization--push China's consumers to reduce wheat demand over the next 25 years.

The deficit of other grain (which is mostly maize), on the other hand, experiences a rapid rise, and by 2020 almost all of China's cereal import needs will be for maize (Table 3, row 4). Taste preferences for meat and rising incomes stimulate meat demand, and indirectly feed demand, to such a great extent that after maize imports begin early in the 21st century, they expand continuously even though maize supply also accelerates. Major breakthroughs in maize technology (such as adoption of varieties with BT corn genes or new foreign-bred hybrids) could delay large imports.

In fact, structural change of any type, such as unanticipated shifts in cropping patterns, could drastically alter the pattern of commodity-specific forecasts. For example, rising wages could induce farmers to give up their intensive wheat-maize rotations in North China. If relative prices favored maize over wheat, large numbers of farmers might decide to stop producing winter wheat and plant a single crop of higher yielding maize. Such a change would work against the formation of the new patterns of imports, and China could end up continuing to import wheat and export (or at least not import) maize. The same type of trade-off could happen in the Yangtse Valley in the intense rice-wheat regions.

Alternative Projections

To test the sensitivity of the results to changes in the underlying forces driving the supply and demand balances, a number of alternative scenarios are run, altering the baseline growth rates of the key variables, including income, wages, and price, population, and investment in technology. The results indicate that low population growth rates would reduce grain demand by 32 mmt in 2020 and make China into a marginal grain exporter by the end of the projection period (Table 3, rows 5). With high population growth, imports increase to 56 mmt (rows 6). Low income growth causes a decline in projected total grain demand from 601 mmt to 555 mmt, resulting in moderate exports of grain in 2020, while rapid income growth causes projected imports to nearly triple to 85 mmt (rows 7-8).

Imports rise sharply to 44 mmt if real wages increase faster (e.g., 2 percent annually) than the baseline rate (1 percent--Table 3, row 5). However, China's still has a large, still-isolated

agrarian population, of which only about one-third have off-farm jobs.⁵⁸ With rising wages, the labor force slowly is becoming integrated with the rest of the economy through emerging labor markets. The enormous increase in labor that can leave rural areas should keep rapid real wage increases from taking off for at least several decades. Moreover, even if wage rates do rise fast, and labor begins flowing off the farm, farmers will replace lower labor input with capital-intensive inputs such as farm machinery and herbicides. Since these types of capital inputs are not in the structural model (because of lack of data), the 1 percent increase in wage rates should be looked on as the percentage increase rise in the wage rate over the rate of rise of the price of capital. If real wages increases (relative to the cost of capital) did approach those in Taiwan and Korea (3 percent annual growth), imports could increase to as much as 58 mmt.

Table 4 also illustrates the large impact of investment in agricultural research and irrigation on production and trade balances (rows 2-3), a result that is hardly surprising given the large contribution to supply of agricultural research and the technology it produces. Increases in the growth rate of agricultural research and irrigation investment from 3.5 percent to 4.5 percent per year transform China from an importer to exporter by early 2010. If, instead, growth in annual investment in the agricultural research system and irrigation fell only moderately, from 3.5 percent per year (as forecast under the baseline projections) to 2.5 percent, by 2020 total production would only be 514 mmt. With no change in the demand-side assumptions, imports under such a scenario would reach a level of 83 mmt.

This level of grain imports could be expected only if there was continued decline in the growth of agricultural investment, and if the government did or could not respond as imports rose to with countervailing policy measures to stimulate food production growth. Agricultural research and irrigation investments, however, have already recovered in recent years, and in the mid-1990s when grain prices rose in response to short term tightening of grain supplies, policy makers have promised and have begun delivering greater agricultural investments.⁵⁹ While most of the investments have been targeted at irrigation, improvements in the operations of research institutes have also been announced.

In addition to domestic investments, the government could also look to the international arena for technological products that would allow China time to redevelop its agricultural research system. In fact, there are currently several large international seed companies investigating the possibilities of moving into the China's market for seeds. Such moves would reduce the expected decline in grain supply, and also decrease the expected level of imports even if growth in public investments slowed. Weak intellectual property rights and tightly controlled and fractured domestic seed markets, however, remain a serious barrier to active participation by multinational technology firms in China.⁶⁰

Production, demand, and imports, however, are insensitive to small changes in price trends, a characteristic that will affect projections of how China's entry into (or exclusion from) the World Trade Organization (WTO) will impact food balances. Output price trends do affect China's grain balances, but the effects are small. At the baseline level, for every 0.5 percent increase (decline) in the annual projected grain price trend, imports fall (rise) by 7 mmt in 2020 (Table 4, rows 6 and 7).⁶¹ The baseline price assumption (an annual 0.5 percent world price decline as projected by both World Bank and Rosegrant, Agcaoili, and Perez), however, was

chosen as the most likely to be realized for two reasons.⁶² Grain prices have trended down in real terms during the entire twentieth century. Also, if China gains admittance to WTO, it politically cannot support prices at the level maintained by its East Asian neighbors. Even without WTO membership, fiscal problems in China may keep it from using high price supports. In the event that China could and decided to adopt a protectionist policy and prices rose in real terms at 0.5 (1.0) percent annually during the next 3 decades, China imports (exports) about 5mmt (7 mmt) in 2020.

Assuming a constant response of production to erosion and salinity as the level of environmental deterioration increases, slight increases in their trends (e.g., an increase of 0.2 percent per year from 0.2 to 0.4) have little impact on output (a decline of only about 4 mmt in 2020--Table 4, the last row). Extrapolating from these results, substantial impacts would not be found until the erosion and salinity rates accelerate to growth levels 5 times greater (or to 1 percent per year increases in erosion and salinity). Even at this level of environmental stress, projected grain imports in 2020 only rise to 51 mmt. Unless the impact of environmental stress is exponential, and the government is unwilling (or unable) to invest in rectifying the adverse aspects of the deteriorating environment, these findings find Brown's pessimism is unfounded.

China has other food policy alternatives and could turn to international meat markets to satisfy its food needs, instead of importing grain as feed. China currently is a net exporter of meat, mostly to Hong Kong and Southeast Asia. If the model allowed for meat imports, China might choose to buy meat on global markets, a move that would reduce projected feed grain imports, but not total agricultural trade volume. If China imported a quantity of meat equal to 10 percent of its 2000 meat demand, grain net imports in 2020 could be reduced to 6 mmt from the baseline of 30 mmt when China relies completely on domestic sources of meat. Without good refrigeration or transportation infrastructure, however, meat imports will be constrained in the near future. In fact, many developing countries prefer to import feed grain and undertake the value-added activity in their own country. But, if high grain imports are unacceptable under China's current political doctrine, importing meat may be one way around such an ideological constraint.

Conclusions

The purpose of this paper was to examine trends in China's grain economy, review the current set of studies that project future supply and demand trends, and then, on the basis of more comprehensive and structurally sound, econometrically estimated models, explore the factors that may be behind these alternative predictions. The authors' framework includes a demand-side model that, in addition to the impacts of income and population trends (as well as income response parameters that vary as income levels rise), accounts for the effects of urbanization and the changing level of the development of rural consumption markets. The supply response model considers the impact of prices, public investment in research and irrigation, institutional change, and environmental factors.

The projections show that under the most plausible expected growth rates in the important factors (most of which are broadly consistent with the major projection models at ERS, Carter and Zhong, and Rosegrant, Agcaoili, and Perez, China's imports will rise steadily throughout the

next decade.⁶³ By 2010, imports are expected to reach 28 mmt, respectively. Increasing imports arise mainly from the accelerating demand for meat and feed grains, as well as by the continued slowing of supply due to reduced investment in agricultural research in the late 1980s. However, after 2010, grain imports are expected to stabilize, as demand growth slows due to increasing urbanization and declining population growth rates; and supply growth is sustained with the ongoing recovery of investment in agricultural research and irrigation. China's dynamic economy and rapidly changing structure may cause changes in the historic patterns of food trade. It could be in 2010, for example, that China imports rice, and that by 2020 it is self-sufficient in wheat and one of the world's largest importers of maize.

There is considerable range in the projections, however, when baseline assumptions are varied in both the short- and long-run. Different rates of agricultural investment create some of the largest differences in expected imports, but this is what should be expected from the factor that it has the largest marginal output response. While there are a few scenarios where projected levels of imports are somewhat large, from both the view point of China's own domestic needs, and relative to the size of current world market trade, there are factors which may keep China from becoming too large of the player in world markets. First, world grain prices would certainly rise in the face of large Chinese imports, a tendency which would dampen Chinese grain demand and stimulate domestic supply. Second, there may be major foreign exchange constraints to importing such large volumes of grain--either government policy makers will not allocate foreign exchange for additional grain imports, or exchange rate movements will discourage imports. Third, limitations on the ability of China's ports and other parts of the nation's transportation and marketing infrastructure to handle large quantities of grains may constrain import levels.

Finally, and perhaps most importantly, many political economy influences may make China's leaders react to increasing grain shortages. Regardless of China's comparative advantage, government leaders have historically, and continue to be, concerned with maintaining near self-sufficient domestic agricultural production capacity. National defense, pride, and ideology will necessarily put a premium on maintaining a rough balance between domestic demand and supply.

On the basis of the results presented in this paper, it appears that China will neither empty the world grain markets, nor become a major grain exporter. It does seem likely, however, that China will become a more important player in world grain markets as an importer in the coming decades. Both potential exporters outside of China and those charged with managing China's food needs through domestic production and imports need to be ready. Exporting nations--especially those dealing with wheat (in the short run) and maize (in the long run) --will undoubtedly be the beneficiaries of these trends. If China's policy makers believe the projected level of imports are too high (either politically or because they see some other physical or economic constraint), investment strategies need to be devised in the near future because of the long lags between the period of expenditure and the time when such investments can affect production. Investment in facilities and institutions needed to handle the increased volume of incoming grain will smooth the shock of production shortfalls, and reduce the time and expense of importing grain. China's foresight in dealing with the upcoming challenge will most likely determine whether the production-demand gap turns into a major agricultural crisis, or whether it will become an opportunity to more effectively develop the nation's food economy.

Table 1. Annual Grain Production, Utilization and Per Capita Food Consumption in China, 1993-1995.

	Disposal of Available Supply										Per Capita Food Consumption ^b		
	Production	Change in Stock ^a	Net Import	Total Supply	Seed	Animal Feed	Nonfood		Waste	Food	Average	Rural	Urban
							Manu-	facturing					
(kilograms)													
Total Grain	403	-2	2	407	17	93	16	15	264	222	242	172	
Rice	126	-3	-0	128	4	7	1	4	109	93	103	68	
Wheat	103	-0	8	111	3	2	2	3	101	85	90	72	
Other Grain ^c	174	1	-6	167	10	84	13	8	55	44	49	32	
-- Maize	105	0	-5	100	3	65	2	3	28	24	31	7	
Red Meat										19	27	17	
Pork										17	23	14	
Poultry										4	7	3	
Fish										7	14	5	

Sources: Computed by authors.

Note: Rice in milled form (trade weight). Base year is average of 1993-95.

^a A negative number indicates a decrease in stocks, which increase total grain supply.

^b Includes direct home consumption, grain purchased and consumed outside of home, and processed foods.

^c Includes maize, other coarse grains and soybean.

Table 2. International Trade Balance (million metric tons) of Major Agricultural Commodities in China, 1985-1996

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996 ^a
Grain	3.3	1.7	-8.9	-8.2	-10.1	-7.9	-2.6	2.0	7.9	4.3	-19.7	-6.1
Wheat	-5.4	-6.1	-13.2	-14.5	-14.9	-12.5	-12.4	-10.6	-6.4	-7.2	-11.6	-5.0
Maize	6.2	5.1	2.3	3.4	3.4	2.5	7.8	10.3	11.1	8.7	-5.1	-0.4
Rice	0.8	0.6	0.5	0.4	-0.7	0.3	0.6	0.9	1.3	1.0	-1.6	-0.3
Soybean	1.1	1.1	1.4	1.3	1.2	0.9	1.1	0.5	0.3	0.8	0.1	-0.2
Other grain	0.5	1.0	0.0	1.3	0.9	0.9	0.3	0.9	-0.1	0.0	-1.6	-0.2
Cotton	0.35	0.59	0.75	0.43	-0.25	-0.25	-0.17	-0.14	0.14	-0.39	-0.72	-0.39
Sugar	-1.73	-0.91	-1.38	-3.46	-1.15	-0.56	-0.67	0.57	1.40	-0.60	-2.47	-0.18

Sources: State Statistical Bureau, *Statistical Yearbook of China*, (Beijing: China, State Statistical Bureau Press, 1995); Ministry of Foreign Trade, *China Customs Statistics*, (Beijing: Ministry of Foreign Trade Press, January to December, 1995 and January to August, 1996).

^a Data available only for first 6 months of 1996.

Table 3. Projections of Grain Production, Demand, and Net Imports (million metric tons) under Various Scenarios with Respect to Population and Income, 2000-2020.

Alternative Scenario	2000			2010			2020		
	Demand	Production	Net Imports	Demand	Production	Net Imports	Demand	Production	Net Imports
Baseline Grain	449	429	20	516	488	28	600	569	30
-- Rice	134	131	3	142	141	1	147	153	-6
-- Wheat	122	109	13	133	123	10	141	141	0
-- Other grain	193	189	3	242	224	17	312	273	38
Baseline with low population growth									
Grain	446	429	17	501	488	13	568	569	-1
Baseline with high population growth									
Grain	452	429	23	529	488	41	625	569	56
Baseline with low income growth									
Grain	441	429	12	494	488	6	555	569	-14
Baseline with high income growth									
Grain	458	429	29	542	488	53	655	569	85

See Appendix 1 for assumptions on population and income growth rates.

Table 4. Sensitivity of Grain Production, Demand, and Net Imports Projections to Alternative Assumptions on Public Investment, Wages, Price Trends, and Deterioration of the Environment, 2000-2020.

Alternative Scenario	2000			2010			2020		
	Demand	Production	Net Imports	Demand	Production	Net Imports	Demand	Production	Net Imports
Baseline	449	429	20	516	488	28	600	569	30
Baseline with low rate of investment in agriculture research and irrigation	449	424	24	516	465	50	597	514	83
Baseline with high rate of investment in agriculture research and irrigation	449	431	18	518	515	3	602	631	-29
Wage growth									
-- Low (0% per year)	449	432	18	517	496	21	600	584	16
-- High (2% per year)	449	427	22	516	481	36	599	555	44
World output price impact									
-- Large (0% per year)	449	430	19	516	492	25	600	576	23
-- Small (-1%)	450	428	21	517	485	32	600	563	37
Fertilizer price growth									
-- Low (0% per year)	449	433	16	517	501	16	601	594	7
-- High (2% per year)	449	425	24	516	476	40	598	546	52
Salinity and erosion growth									
-- Low (0% per year)	449	430	19	517	491	26	600	574	26
-- High (0.4% per year)	449	428	21	516	486	31	599	565	35

See Appendix 2 for assumptions on growth rates of prices, investment and environmental variables.

Appendix 1. Assumptions on the Growth of Factors Affecting Grain Demand in China, 1994-2020.

Factors	Annual Growth Rate (%)		
	Low	Baseline	High
Total Population			
1995-2000	0.933	1.055	1.165
2000-2010	0.491	0.740	0.932
2010-2020	0.374	0.649	0.844
-- Rural			
1995-2000	0.218	0.343	0.461
2000-2010	-0.515	-0.252	-0.047
2010-2020	-0.873	-0.606	-0.413
-- Urban			
1995-2000	2.633	2.750	2.842
2000-2010	2.424	2.650	2.825
2010-2020	2.158	2.450	2.658
Per Capita Real Income			
-- Rural	2.0	3.0	4.0
-- Urban	2.5	3.5	4.5
Prices			
-- Rice	-1.0	-0.5	0.0
-- Other Grain	-1.0	-0.5	0.0
-- Meat	-0.5	-0.5	-0.5
Rural Market Development			
-- 2000	0.60	0.60	0.60
-- 2010	0.70	0.70	0.70
-- 2020	0.80	0.80	0.80

Note: The shares of urban population under baseline assumption are 28, 31, 38, and 45 percent for 1995, 2000, 2010 and 2020. Population estimates are based on United Nations, *World Population Prospects, 1994 Revisions*, (New York, NY: United Nations, 1995). Output prices are based on simulation analysis performed in collaboration with the IMPACT model developed by the International Food Policy Research Institute (M. Rosegrant, M. Agcaoili, and N. Perez, "Global Food Projections to 2020: Implications for Investment" 2020 Vision Discussion Paper Series, No. 5, International Food Policy Research Institute, Washington, DC, 1995). Figures for the rural market development are index numbers for the year indicated, J. Huang and S. Rozelle, "Market Development and Food Demand in Rural China." *China Economic Review*, forthcoming.

Appendix 2. Assumptions on the Growth of Factors Affecting Grain Supply in China, 1994-2020.

Factors	Annual Growth Rate (%)		
	Low	Baseline	High
Output and Input Prices			
-- Rice	-1.0	-0.5	0.0
-- Other Grain	-1.0	-0.5	0.0
-- Fertilizer	0	1.0	2.0
Land and Labor			
-- Land opportunity cost	1.0	1.0	1.0
-- Wage	0.0	1.0	2.0
Agricultural Research Expenditure	2.5	3.5	4.5
Irrigation Expenditure	2.5	3.5	4.5
Environmental Factors			
-- Salinity	0.0	0.2	0.4
-- Erosion	0.0	0.2	0.4

Notes: Agricultural research and irrigation expenditures are extrapolated from recent trends and are adjusted based on Li Peng, 1996, "National Economy and Social Development for the Ninth Five-Year Plan and 2010 Long Term Goals," People's Press, Beijing. The "Land opportunity cost" growth rate is an extrapolations from trends State Price Bureau, "Compendium of Cost of Production Data," (Beijing: State Price Bureau Press, 1988-95). Land opportunity cost is assumed to be the return to grain cropping (total revenues) net of expenditures for labor (including own labor valued at the market wage), farm chemicals, and other cash expenses. Output price trends are based on simulation analysis performed in collaboration with the IMPACT model reported in M. Rosegrant, M. Agcaoili, and N. Perez, "Global Food Projections to 2020: Implications for Investment" 2020 Vision Discussion Paper Series, No. 5, International Food Policy Research Institute, Washington, DC, 1995. Fertilizer price trends are similar to those used by the World Bank, *Agriculture to the Year 2000*, A World Bank Country Study (Annex 2 to China: Long-term Development Issues and Options), Washington, DC, 1990. The trends in the deterioration of the environment are based on extrapolations of past trends.

Appendix 3. Projected Annual Per Capita Food Grain Consumption under Alternative Income Growth Scenarios in China, 1994-2020.

Alternative Scenario	Per Capita Food Grain Consumption (kg)			
	1994	2000	2010	2020
Base Line				
Total Grain	222	223	219	210
-- Rural	242	245	246	243
-- Urban	172	175	174	168
Rice	93	94	93	90
-- Rural	103	105	107	109
-- Urban	68	69	69	68
Wheat	85	86	87	86
-- Rural	90	92	95	95
-- Urban	72	74	76	75
Other Grain	44	42	38	34
-- Rural	49	47	44	40
-- Urban	33	31	29	25
Low Income Growth				
Total Grain		221	216	208
-- Rural		242	243	241
-- Urban		174	173	169
Rice		93	91	98
Wheat		85	86	84
Other Grain		43	39	35
High Income Growth				
Total Grain		224	221	211
-- Rural		247	249	246
-- Urban		176	174	167
Rice		95	95	92
Wheat		87	89	87
Other Grain		42	37	32

Appendix 4. Projected Annual Per Capita Consumption of Meat and Fish under Alternative Income Growth Scenarios in China, 1994-2020.

Alternative Scenario	Per Capita Meat Consumption (kg)			
	1994	2000	2010	2020
Baseline				
Red Meat	19	23	32	43
-- Rural	17	20	26	33
-- Urban	27	30	40	52
Poultry	2	3	5	8
-- Rural	1	2	3	4
-- Urban	5	6	8	12
Fish	8	10	17	28
-- Rural	5	6	9	14
-- Urban	14	18	28	43
Low Income Growth				
Red Meat		22	27	34
-- Rural		18	22	27
-- Urban		28	34	42
Poultry		3	4	6
-- Rural		2	2	3
-- Urban		5	7	9
Fish		9	14	20
-- Rural		6	8	10
-- Urban		16	22	30
High Income Growth				
Red Meat		25	36	53
-- Rural		21	30	41
-- Urban		32	46	65
Poultry		4	6	10
-- Rural		2	3	5
-- Urban		6	10	16
Fish		11	21	40
-- Rural		7	12	19
-- Urban		20	35	61

Appendix 5. Demand for Feed Grain under Alternative Population and Income Growth Scenarios in China, 1994-2020.

Alternative Scenario	Demand for Feed Grain (million metric tons)		
	2000	2010	2020
Baseline Population Growth			
-- Low Income Growth	111	147	197
-- Base Income Growth	117	166	240
-- High Income Growth	124	189	294
Low Population Growth			
-- Low Income Growth	110	143	186
-- Base Income Growth	116	161	226
-- High Income Growth	122	183	277
High Population Growth			
-- Low Income Growth	112	151	205
-- Base Income Growth	118	171	250
-- High Income Growth	125	194	308

Note: Total feed grain is 93 million metric tons in the base year (1993-95).

¹ L. Brown, "How Could China Starve the World: Its Boom is consuming Global Food Supplies." *Outlook Section, Washington Post*, August 28, 1994.

² An alternative explanation for the seeming contradiction of declining imports along with rising meat demand has been suggested by Fred Crook of the USDA's Economic Research Service. He believes that grain production may be underestimated by as much as 10 percent, some of which may have contributed to growing farm stocks in the 1980s that were used as feed and food in the early 1990s.

³ Bridges Online News Service (An Associated Press Report), August 26, 1997.

⁴ S. Fan and M.C.A. Agcaoili, "Why Do Projections on China's Food Supply and Demand Differ?" Environment, Production, and Technology Division Discussion Paper No. 22. International Food Policy Research Institute, Washington, DC, 1997.

⁵ Chinese Academy of Agricultural Sciences (henceforth, CAAS), "Abstract of the Comprehensive Report on Study of the Development of Grain and Cash Crops Production in China." Chapter in *Study of the Development of Grain and Cash Crop Development in China--Volume 4*. CAAS, eds. Beijing, China: Chinese Academy of Agricultural Sciences, 1985.

⁶ L. Y. Chen and A. Buckwell, *Chinese Grain Economy and Policy*. (Wallingford, UK: C.A.B. International, 1991).

⁷ Economic Research Service of the United States Department of Agriculture (henceforth, ERS). "Projections Model for Predicting Agricultural Output: An Introduction," *Research in China--Issues and Data Sources*. Proceedings of WRCC-101, Washington, DC, April 21-22, 1995.

⁸ K. Anderson, B. Dimaranan, T. Hertel, and W. Martin, "Asia-Pacific Food Markets and Trade in 2005: A Global, Economy-wide Perspective," *The Australian Journal of Agricultural and Resource Economics*, 41 No. 1 (1997):19-44.

⁹ R. Garnaut and G. Ma. *Grain in China: A Report*. (Canberra, Australia: East Asian Analytical Unit, Department of Foreign Affairs and Trade, 1992).

¹⁰ C. Carter and F. Zhong, "China's Past and Future Role in the Grain Trade," *Economic Development and Cultural Change* 39 (July 1991):791-814.

¹¹ Chen and Buckwell.

¹² Alternatively, if the baseline starting points differ, significant variations in predictions can occur, even if the projection frameworks are alike in all other aspects. In fact, because of differences in estimates of meat consumption, one of the factors that causes the largest differences among the models is that some analysts use per capita meat production figures as a starting point for their baseline take-off point, while others use figures based on consumption figures. Unfortunately, because of overreporting of production figures (due to double counting and local leader exaggeration) and under estimation of consumption (due to the fact that current enumeration techniques overlook much of the consumption activities that occurs outside of the household--e.g., in restaurants), production-based estimates of demand have grown to be more than 200 percent higher than those estimates based on consumption data. In a recent conference, the Post-Conference Workshop on "China's Food Economy in the 21st Century," Annual Meetings of the American Agricultural Economics Association, Toronto, July 31, 1997, the baseline level of meat demand projections was determined to be one of the single most important factors distinguishing the various predictive models.

¹³ Brown.

¹⁴ Carter and Zhong.

¹⁵ Garnaut and Ma; Chen and Buckwell.

¹⁶ ERS.

¹⁷ High import projections for supply-side reasons come from Brown; Carter and Zhong; those for demand side reasons are from Garnaut and Ma; ERS.

¹⁸ S. Fan, G. Cramer, and E. Wailes, "The Impact of Trade Liberalization on China's Rice Sector," *Agricultural Economics* 11(September 1994):71-81.

¹⁹ Fan and Agcaoili; and ERS.

²⁰ Carter and Zhong; and Fan, Cramer, and Wailes.

²¹ T. Sicular, "Redefining State, Plan and Market: China's Reforms in Agriculture Commerce," *China Quarterly* 143(December 1995):1020-1046; and A. Watson, "China's Agricultural Reforms: Experiences and Achievements of the Agricultural Sector in the Market Reform Process," Working Paper 94/4, Chinese Economy Research Unit, University of Adelaide, Adelaide, Australia, 1994.

²² S. Rozelle, A. Park, J. Huang, and H. Jin, "Bureaucrat to Entrepreneur: The Changing Role of the State in China's Grain Economy," Working Paper, Department of Economics, Stanford University, Stanford, CA, 1997.

²³ Garnaut and Ma; and Carter and Zhong.

²⁴ J. Huang and S. Rozelle, "Income, Quality, and the Demand for Food in Rural China," Working Paper, Food Research Institute, Stanford University, 1994; J. Huang and S. Rozelle, "Urban Life, Urban Consumption." Working Paper, Food Research Institute, Stanford University, Stanford, CA. 1995; S. Fan, E. Wailes, and G Cramer, "Household Demand in Rural China: A Two-Stage LES-AIDS Model," *American Journal of Agricultural Economics* 77(February 1995):54-62; and C. Halbrendt, F. Tuan, C. Gempeshaw, and D. Dolk-Etz. "Rural Chinese Food Consumption: The Case of Guangdong," *American Journal of Agricultural Economics* 76(November 1994):794-799.

²⁵ J. Huang and S. Rozelle, "Market Development and Food Demand in Rural China," *China Economic Review* forthcoming.

²⁶ J. Huang and H. Bouis. "Structural Changes in Demand for Food in Asia." Food, Agriculture, and the Environment Discussion Paper 11, International Food Policy Research Institute, Washington DC, 1995; J.Huang, C. David, "Demand for Cereal Grains in Asia: the Effects of Urbanization," *Agricultural Economics*, 8(Spring 1993):107-124.

²⁷ Huang and Bouis.

²⁸ Huang and David.

²⁹ In general, based on a recent work by S. Rozelle, G. Li, M. Shen, H. Li, J. Giles, T. Low, "Poverty Networks, Institutions, or Education: Testing Among Competing Hypotheses on the Determinants of Migrations in China, Paper Presented on the 1997 Annual Meetings of the Association for Asian Studies, Chicago, IL, March 13-15, 1997, there are probably about equal number of migrants coming from the north as south.

³⁰ J. Huang and S. Rozelle, "Technological Change: Rediscovering the Engine of Productivity Growth in China's Agricultural Economy," *Journal of Development Economics* 49 (July 1996):337-369.

³¹ J. Lin, "The Household Responsibility System Reform and the Adoption of Hybrid Rice in China." *Journal of Development Economics*. 36(1991):353-373.

³² B. Stone, "Developments in Agricultural Technology," *China Quarterly* 116(December 1988); S. Rozelle and J. Huang, "China's Wheat Economy: Supply, Demand, Marketing, and

Trade in the 21st Century," Paper Presented at Montana State University Trade Research Center's Conference on "World Wheat Economy," Bozeman, Montana, May, 1997; J. Huang and S. Rozelle, "Technology and Grain Supply in China," Working Paper, Center for Chinese Agricultural Policy, Beijing, China, 1997.

³³ Huang and Rozelle, "Technological Change...", 1996; and J. Huang, M. Rosegrant, and S. Rozelle, "Public Investment, Technological Change and Agricultural Growth in China." Paper Presented in the Final Conference on the Medium- and Long-Term Projections of World Rice Supply and Demand, Sponsored by the International Food Policy Research Institute and the International Rice Research Institute, Beijing, China, April 23-26, 1995; and S. Fan and P. Pardey, "Role of Inputs, Institutions, and Technical Innovations in Stimulating Growth in Chinese Agriculture," Working Paper, International Food Policy Research Institute, Washington DC, 1995.

³⁴ R. Conroy, "The Disintegration and Reconstruction of the Rural Science and Technology System," Chapter in A. Saith, ed., *The Reemergence of the Chinese Peasantry* (London: Croom Helm Press, 1987); S. Rozelle, C. Pray, and J. Huang, "Agricultural Research Reform in China: Testing the Limits of Commercialization-led Reform," Working Paper, Department of Economics, Stanford University, 1996.

³⁵ State Science and Technology Commission (henceforth SSTC), *Zhongguo Kexue Jishu Ziliao Ku, 1985-90*; 93 [China Science and Technology Statistical Yearbook, 1985-90; 93--in Chinese], (Beijing, China: State Science and Technology Commission, 1991; 1993).

³⁶ S. Fan and P. Pardey. *Agricultural Research in China: Its Institutional Development and Impact* (The Hague, Netherlands: International Service for National Agricultural Research, 1992).

³⁷ J. Nickum, "Dam Lies and Other Statistics: Taking the Measure of Irrigation in China, 1931-1991," East-West Center Occasional Papers, Environment Series Number 18, Honolulu, HI, 1995.

³⁸ Ministry of Water Resources and Electrical Power (henceforth MWREP), *Compiled Statistics on the Development of China's Water Conservancy System* (Beijing, China: Ministry of Water Conservancy, 1988-92).

³⁹ Huang, Rosegrant and Rozelle.

⁴⁰ M. Rosegrant, M. Agcaoili, and N. Perez, "Global Food Projections to 2020: Implications for Investment," 2020 Vision Discussion Paper No. 5, International Food Policy Research Institute, Washington, DC, 1995.

⁴¹ Technology was measured in stock form, and was built by aggregating past government expenditures on research according to a weighting criteria suggested by P. Pardey, R. Lindner, E. Abdurachman, S. Wood, S. Fan, W. Eveleens, B. Zhang, and J. Alston, "The Economic Returns to Indonesian Rice and Soybean Research," Report Prepared by the Agency for Agricultural Research and Development (AARD) and the International Service for National Agricultural Research (ISNAR), November 1992. Irrigation stock was constructed by aggregating public expenditures on irrigation, subject to a depreciation rate of 4 percent per year, a rate used by M. Rosegrant and F. Kasryno, "Dynamic Supply Response for Indonesian Food Crops," Working Paper, International Food Policy Research Institute, Washington DC, 1994. The environmental variables have been described and analyzed in J. Huang and S. Rozelle, "Environmental Stress and Grain Yields in China," *American Journal of Agricultural Economics* 77, No. 4 November 1995):246-256.

⁴² The general supply-side parameter were first estimated in Huang, Rosegrant, and Rozelle. More recent commodity specific estimates for wheat are in Rozelle and Huang (1997); and for maize are in Huang and Rozelle (1997).

⁴³ H. Bouis, "Prospects for Rice/Supply Demand Balances in Asia," Working Paper, International Food Policy Research Institute, Washington DC, 1989; and Huang and David. The parameters relating demand behavior to rises in income use expenditure data instead of income due to the difficulty in comparing urban and rural income since the former includes large subsidies for housing, health care, etc. The analysis does not consider the impact of urban housing, education, and health reforms, which would have two effects on food consumption. If urban residents paid market rates for all good and services, the income effect would reduce consumption of all goods, including food. The cross price effects, however, would offset part of this drop.

⁴⁴ A. Deaton and J. Muellbauer, "An Almost Ideal Demand System," *American Economic Review* 70(1980):321-26.

⁴⁵ Huang and Rozelle, "Income, Quality, and ..., 1994; J. Huang and S. Rozelle, "Urban Life, ..., " 1995; and Huang and Bouis.

⁴⁶ See F. Fuller and J. Rude, "An Approach to Policy Analysis and Projection for the Agricultural Sector of the People's Republic of China," Paper Presented at the Post-Conference Workshop on "China's Food Economy in the 21st Century," Annual Meetings of the American Agricultural Economics Association, Toronto, July 31, 1997. There is still much uncertainty about the current estimates of meat demand parameters, mainly due to data problems. In the published data, production statistics report a level of pork output that is more than twice as great as the level of pork consumption as reported in China's income and expenditure data. The discrepancy probably has a number of components. Many researchers in China believe current demand figures miss a significant part of family member consumption that occurs out of the household (e.g., dining in restaurants, etc.). It is also suspected that production figures are inflated, in part because of statistical problems (mostly a double counting problem), and in part because local official may have an incentive to overstate pork production, since unlike grain, monitoring of livestock production is much more difficult and the probability of being caught for exaggerating production numbers is minimal.

⁴⁷ Feed conversion parameters are from ERS and are consistent with estimates used by Chinese agriculturists found in handbooks used by Ministry of Agricultural officials. Officials, however, told us that they believed these rates were too high. This would mean that the demand for feed and imports are over estimated. However, commercialization of China's livestock industry is occurring rapidly, which would mean that conversion rates should increase over time (since farmers tend to feed scraps and other non-grain feed stuffs to hogs). Hence, any over-estimation in the short run should be eliminated at some point during the study period. Current research by the authors is centered on obtaining a better set of feed efficiency rates.

⁴⁸ Huang, Rozelle, and Rosegrant.

⁴⁹ The baseline assumptions for population growth rates in the three study decades implies an overall projection period population growth rate of 0.89, a level slightly higher than that assumed by Rosegrant, Agcaoili, and Perez (0.74). There are many reasons to believe with increasing reform, the government's ability to control fertility may lessen, and future rates of population growth may be greater than the baseline rates. Rosegrant, Agcaoili and Perez use an alternative rate of 1 percent per year. In this study's high-population growth scenario, it is assumed the

growth rate in the first decade is 1.413, the second, 0.932, and the third, 0.844, implying an overall study period growth rate of 1.06. In a later section, results are presented showing the sensitivity of the conclusions to the choice of population growth rates.

⁵⁰ According to J. Huang and C. David, "Price Policy and Agricultural Incentive in China," A Report Submitted to Food and Agriculture Organization of UN, FAO, Rome, 1995, while once far out of line with world agricultural prices, in recent years China's market prices have converged with those in international markets. In an initial set of runs, constant real prices were assumed. The projected growth rates in production and demand (and thus net imports of rice and other grain) were then simulated in IFPRI's IMPACT model to generate projected world prices with China entering as a significant importer. These projected world prices were then used as the baseline projections for the China projections model: world grain prices are expected to fall by 0.5 percent annually throughout the projection period. Meat prices are assumed to follow a similar trend.

In this sense, the assumption is consistent with China's entry into GATT, where in the long run Chinese producers will not be protected or taxed by border restrictions. Since China's current grain prices are nearly the same as world market ones, there is also no obvious one time effect from liberalization. The case would be different if China went the route of its prosperous East Asian neighbors, and begin to protect its producers with ever-increasing prices. Severe fiscal problems, however, most likely rule out such a strategy.

⁵¹ Huang and Rozelle, "Market Development ...," 1997.

⁵² S. Rozelle, J. Huang, and M. Rosegrant, "How China will NOT Starve the World," *Choices* (First Quarter 1996):10-16; J. Huang, S. Rozelle, and M. Rosegrant, "Supply, Demand, and Trade in China," An IFPRI 2020 Vision Working Paper, International Food Policy Research Institute, Washington, DC, 1996.

⁵³ P. Yotopolous, "Middle-Income Classes and Food Crisis: The "New" Food-Feed Competition," *Economic Development and Cultural Change*, 33 (April 1985):463-484.

⁵⁴ In addition to projected food and feed demand, total grain demand also includes use of grain for seed, nonfood manufacturing, and waste. Projected values of these uses are calculated by roughly maintaining the same ratios as found in the initial year of the baseline.

⁵⁵ MOA

⁵⁶ Fan, Wailes, and Cramer; and ERS.

⁵⁷ Fan and Agcaoili; and ERS.

⁵⁸ S. Rozelle, G. Li, M. Shen, J. Giles, and T. Low.

⁵⁹ J. Huang, "Agricultural Policy and China's Agricultural Performance," Working Paper, Center for Chinese Agricultural Policy, Beijing, China, 1996.

⁶⁰ Rozelle, Pray, and Huang.

⁶¹ Import projections are not very sensitive to changes in prices for two reasons. First, our estimated supply own-price response elasticities are small, a characteristic that is commonly found in other Asian countries where the government frequently intervenes into the agricultural decision making process. Second, on the demand side, although there are fairly large negative own-price elasticities, positive cross price elasticities dampen the reduction (increase) in demand when prices rise (fall). Similar magnitudes are observed with changes for the price of fertilizer; by increasing (decreasing) the projected growth of fertilizer prices by 1 percent, imports increase (decrease) by 4 MMT. Hence, if the past trends hold--i.e., falling grain prices and rising fertilizer prices, the change in China's output to input price ratio means more imports will be required to meet the

nation's projected deficit (at least through the medium run when higher imports would force prices up, offsetting part of the deteriorating output-to-fertilizer price relationship).

⁶² Rosegrant, Agcaoili, and Perez.

⁶³ ERS; Carter and Zhong; and Rosegrant, Agcaoili, and Perez.

Development of China's Agriculture and Outlook

Min Yaoliang, Zhang Yuxiang, Chen Zhixin
Ministry of Agriculture

Dear Mr. Chairman,
Ladies and Gentlemen,

It is an honor for my two colleagues and for me from the Ministry of Agriculture, and for Mr. Zhu Xiangdong and his two colleagues from the State Statistics Bureau to attend the 1999 Agricultural Outlook Forum at the invitation of the Department and give an introduction of China's agriculture.

China has a population of 1.2 billion and is a large producing and consuming country of agricultural products. What is the agricultural situation in China? How are the farmers' income and living? All these have direct bearing on the overall situation of China's economic reform, development and social stability. This is also an issue of common concern.

The reform on agricultural marketing started in 1978 and has achieved great progress. The efficiency of system and the years' accumulation in construction resulted in the obvious increase of agricultural comprehensive production capacity and brought the development of agriculture and rural economic development into a new stage. The supply of and demand for major agricultural products become generally balanced. In the years of good harvest, there is even a surplus of supply. For the 20 years between 1978 and 1997, the average annual development speed China's agriculture was 6.7%. In 1997, the total production of grain, cotton, oil and sugar increased respectively by 62%, 110%, 310% and 290% if compared with 1978. These not only ensured the market supply, enriched the "Vegetable Basket" and table dishes, but also made important contribution to the continuous speedy development of national economy and control of inflation. Among these, the annual growth rate of grain production was 2.7%, which is much more than that of population. The per capita farmer's net income increased from 134 yuan RMB to 2090 yuan RMB in 1997, with a growth rate of 8.1%. Farmers' life has been improved obviously.

In 1998, though seriously influenced by the huge flood disasters and the financial crisis in Asia, China's agriculture and rural economy maintain a momentum of stable development. Total grain production is estimated to be over 490 million tons, equaling to the same amount of 1997. The production of cotton amounted to 4.33 million tons, decreased by 5.9%; oil crops amounted to 22.65 million tons, increased by 5%; the production of sugar, aquatic products, vegetable and other economic crops also increased and structure was slightly optimized. The production of meat and aquatic products grew steadily. The added value of township enterprises increased by 17.5% than last year, absorbing addition 3 million agricultural labor forces. It is estimated that farmers' net income grew by 4%.

At present, the development of agriculture in China is also facing some serious constraints. Firstly, the previous constraint for agricultural development is only resource. Now agricultural development faces two limits: resources and market. In recent years, the marketing channels for some agricultural products were blocked and the prices fell down. On one hand, this is because of the unreasonable structure of agricultural production, some varieties and quality of agricultural products can not meet the market demand; on the other hand, this is because of the

imperfect marketing system and blocked circulation of agricultural products. There are still many works to do in the setting up of nation-wide, open, competitive and perfect order market of agricultural products. Secondly, the growth of farmers' income was slow. In 1997, the per capita farmer's net income grew by 4.6%, 4.4% less than in 1996. In 1998, the growth of farmers' income continued to be less. Thirdly, the agricultural basic infrastructure is weak, without strong capacity to resist natural disasters. It is a heavy task to repair and rebuild the basic infrastructures damaged in 1998 serious floods. Fourthly, the rural policies have not been implemented well in some places.

The 3rd Plenary Session of the 15th Central Party Committee of the Communist Party of China was held in Oct. 1998. This Session specially studied the issues of agriculture and rural economy, adopted important decisions and formulated the inter-century development objectives and principles. At present, the Chinese Central Government and the local governments at various levels are implementing these important decisions conscientiously.

In 1999, China's agriculture and rural economy will maintain a momentum of stable development. All the work will be based on the stable supply of agricultural products and focus on the growth of farmers' income. Great attention will be paid to: 1) stabilizing the basic rural policies and deepening the rural reform; 2) optimizing agricultural structure through adjustment and improving the quality and efficiency of agricultural products; 3) making great efforts in the development of township enterprises and speeding up the construction of small towns and cities; 4) strengthening the construction of agricultural basic infrastructures and ecological environment and keeping a sustainable development of agriculture; 5) implementing the policies of agricultural development through science and education and pushing forward the revolution on agricultural science and technology; 6) attaching more importance on the work of poverty reduction and further implementing various policies of poverty reduction.

In 1999, the Chinese Government will provide guidance to the farmers to follow the market changes, take the quality improvement of agricultural products as the center and optimize the structure of agricultural products through adjustment while ensuring the stable growth of total grain production. Firstly, in grain production, the varieties not suitable for sales will not be produced and focus will be laid on the development of quality rice, special wheat for processing and quality protein corn. Secondly, in cotton and oil-bearing crop production, attention will be given to stabilization of Xinjiang cotton area and slightly reduce the cotton areas of Hebei, Shangdong, Henan and Yangtze River area. More efforts will be made to the increase of unit yield and quality of cotton and to speeding up the development of quality rapeseed varieties. Thirdly, more importance will be attached to the development of livestock production. While stabilizing the pig production, more attention will be paid to the animal and poultry production of grain saving and with high conversion rate, and to the herbivorous animal production. Fourthly, more attention will be paid to the development of processing, storage, fresh-keeping and transportation of agricultural products. Fifthly, the circulation and marketing of agricultural products will be further activated, the marketing system of agricultural products with wholesale market as the center will be perfected and the information release system will be set up and standardized.

I would like to give more comments on the future set-up of supply and demand of agricultural products, grain in particular, and the trend of import and export trade.

Generally speaking, the balance between grain supply and demand in China needs to be further improved. With the growth of population and people's living standard, more attention should be paid to the increase of total grain production and diversified grain production. Therefore, There is a long way to go before the supply can fully meet the demand.

According to the food consumption model and the future population growth trend in China,

if population is close to 1.3 billion by 2000, the total demand will be 500 million tons with 385 kg of per capita availability; if population gets close to 1.4 billion by 2010, the total demand will be 550 million tons with 390 kg of per-capita availability; if population reaches the peak of 1.6 billion, the total demand will be 640 million tons with per-capita availability of 400 kg.

In grain supply, the Chinese Government will take the following measures to increase total supply: to increase the unit yield of existing cultivated land, reclaim land resources in reserve, rely on the progress of science and technology, develop non-food resources, save grain in use, etc.

As it is known to all, the per-capita availability of agricultural resources in China is at a low level in the world, the shortage of cultivated land and water resources is the most serious constraint in the development of agriculture. Under such conditions of resources, China will have to make unswerving efforts to build up agricultural productive force much higher than the world's average level.

By relying on her own efforts in balancing the domestic supply and demand of grain, China does not exclude the use of international resources and market as an important measure to balance the good and bad harvests, adjust varieties and circulation between regions. Historically speaking, China did not rely so much on the international market. From the founding of New China to the 60s, China was a net exporter of grain. After the 60s, China imported more grain than exported. With the introduction of reform and opening to the outside world at late 70s, the portion of net imported grain in the total domestic grain production was getting less: 3.2% for the period 1978-1984, 1.2% for 1985-1990 and 0.4% for 1991-1995. The amount of net import for the years 1996-1998 amounted to 0.4% of the total production. Small amount of grain import by China will not threaten the world food security. In addition, China also imported some food. For the period, the export of Chinese food and edible animal and poultry amounted to 75.6 billion US\$ and import amounted to 34 billion US\$. Since 1995, there has been rather good harvest for China's agriculture for the past 4 consecutive years. Domestic supply and demand has been basically balanced with rather abundant reserve. China has turned to be a net exporter of grain in 1997 and 1998 from a net importer before. However, the amount of export is limited. In a word, being a developing country with large size of population and limited per-capita agricultural resources, China will become neither a large exporter of agricultural product, nor a big importer of agricultural products.

China is willing to develop trade of agricultural products with other countries in the world on the basis of mutual benefit.

Comments on Mr. Scott Rozelle's paper:

Mr. Scott Rozelle, in cooperation with Mr. Huang Jikun, Ph.D of the Chinese Academy of Agricultural Sciences, conducted detailed study and analysis on the supply, demand and the history of import and export of China's agricultural products, grain in particular. At the same time, Mr. Rozelle reviewed the related studies on the subject by people from various fields, collected a lot of information. Based on this, he made his prediction and analysis using mathematics module and formed some new viewpoints and conclusions.

Firstly, the future supply and demand for grain in China. I feel sorry to repeat our conclusions. Generally speaking, The slightly tight relations between supply and demand of grain in China will exist for a long time. China must rely on domestic efforts in feeding over

1 billion people, meanwhile, the use of international resources and international market should be regarded as an important measure to adjust the bad and good harvests, varieties and regional balance. In Mr. Rozelle's paper, it is predicted that the net import of grain by China will be around 28-30 million tons by 2010. We don't think China will import such a large amount. It is interesting to recall that, as early as 1980s and early 1990s, some experts at home and abroad predicted that China would import quite large amount of grain by 2000. However, the reality is that, due to the good harvests of agriculture in several consecutive years, basic balance of supply and demand of grain is realized. In the years with bumper harvests, the supply is even over the demand.

Secondly, the specific kind of grain to be imported by China in the future. We feel it is difficult to tell whether China will import wheat, corn or rice. Practical decision will have to be made according to the agricultural harvest, change of supply and demand and the international market in that particular year in China. Looking back at the historical and present situation, China imported mainly wheat and soybean; exported mainly corn and rice. Therefore, the basis for Mr. Rozelle's prediction that China will import large amount of corn and rice after 2000 is the speeding up of rural urbanization and increase of rural population. We think that this prediction and its basis are subject to further consultation. Rice production is the advantage of China. Meanwhile, according to the consumption habit, the living standard of urban population is higher than that of rural population, the urban population pays more attention to the diversification of diet, thus, there will be more consumption of wheat instead of rice.

Finally, we thank again the USDA for the opportunity to attend this Forum.

Mr. Zhu Xiangdong and I will be pleased to answer your questions.

Alignment of Public/Private Institutions
in the Biotechnology Revolution

by Gordon C. Rausser

Robert Gordon Sproul Distinguished Professor and
Dean of the College of Natural Resources
University of California, Berkeley

1. Introduction

- 1.1 Public Policy
 - 1st half of century
 - 2nd half of century
- 1.2 R and D Incentives in the Private Sector
- 1.3 R and D Incentives in the Public Sector
 - Pre Bahy-Dole-Act (1980?)
 - Post Bahy-Dole-Act
- 1.4 Position of Land Grant Universities
 - Old vs. new knowledge
 - Science and practical knowledge
 - Evolution of research universities from pure scholarship, to science to entrepreneurship (Peter David, Etzkowitz)
- 1.5 Structure of Technology Transfer
 - Secrecy and the role of transparency
 - Role of modern economics and finance
 - Core of real options
- 1.6 Future Scenarios in US Agriculture
- 1.7 Organization of Paper
 - Public policy
 - Current position in future scenarios for US Agriculture
 - Science and technology
 - New vs. old paradigm
 - Challenges and concluding remarks
- 1.8 Role of Information in Public Decision-Making: Secrecy and the Role of Transparency (see page 9 of R)

2. Public Policy

- 2.1 Intellectual Property Right Protection (Wright; Koo)
 - Patent license
 - Material transfer agreement
 - Bag label contracts
 - Technology use agreement
 - Trade secret
- 2.2 Bahy-Dole Bill

- The promotion of economic growth: capturing market value
 - Assignment of property rights
 - Recent government accounting office review
 - April 1998 House hearing on irreplaceable Federal role in funding basic scientific research
 - Jensen & Thursby survey
- 2.3 Land Grant University Private Research Partnerships
 - Just-Rausser findings
 - Option design
 - Policy evolution
 - Crowding out of public good research
- 2.4 Public Good vs. Private Good research
 - Provision vs. Use (heterogeneity of users of Public Good knowledge)

3. Current Position of US Agriculture

- 3.1 Technological opportunities
 - Biotechnology
 - Input traits
 - Insect resistance
 - Herbicide tolerance
 - Fungal resistance
 - Viral resistance
 - Nematode resistance
 - Output Traits
 - Delayed ripening
 - Modified oils
 - Modified proteins
 - High solids
 - Phyto-manufacturing of antibodies, enzymes...
 - Information technologies
 - Natural technologies
 - Globalization
 - Population & economic growth
 - Demand for environmental quality
 - Consolidation of industry & resulting controversy
 - Societal concerns
- 3.2 Roadblocks to Capturing Value (see chart of Larry Jansen)
- 3.3 Structural Changes in US Agriculture; the New Core Concepts
- 3.4 Major Implications
 - Critical role of science & technology (concerns & threats, see pages 10-11, 13)
 - Science will become a critical driver of structural change

- Evolution from commodity-based business to a differentiated-product-based business
- Evolution of value-differentiation patterns (**Value Differentiation**)
- Off-farm control of value differentiation and quality. Here we've only seen the tip of the iceberg with the grower license agreements (see page 13 of Rausser Q&A)

4. Science & Technology

- 4.1 Economic Growth and the Results of the CEA study
- 4.2 Private Good Research (movement toward life-science companies)
 - Complementarities, contractual hazards and legal disputes)
 - Longer-term planning horizons
- 4.3 Public and Private University Research
 - Jensen & Thursby Overview
 - Etzkowitz
 - Land-grant University Experience
 - MIT Experience
 - Integration of scientific and practical knowledge
 - Peter David : Evolution from pure scholarship to science to entrepreneurship
- 4.4 Land-Grant University
 - Page 10 of Peter's paper on democracy
 - Need for transparency; must avoid secrecy
 - Quote from Ruby Green-Smith
 - Tragedy of Commons paper in Science: role of interdisciplinary work and the pursuit of societal problems (see Q & A of Rausser)
- 4.5 Implications
 - Democracy and the need for public transparency (Rausser, Stiglitz)
 - Complementarities
 - Multidisciplinary research (Hardin)
 - Beneficiaries of public good research
 - Integrity of public institutions
- 4.6 Game-Pieces in the Future of Biotechnology and Bargaining Power

5. Existing vs. Alternative Paradigm

- 5.1 Existing Paradigm
 - Linear evolution from public good to private research
 - To achieve tractable representations for which analytical results can be generated innovation is often specified to follow a straight line from basic research (conducted mainly in Universities) through applied R and D (conducted mainly by firms) and hence into the wider economy.
 - As argued in the report prepared by the Council of Economic Advisers, October 1995 (Supporting Research and Development to Promote Economic Growth: the Federal Government's Role)
 - “Ideas flow from basic research, through pre-competitive development to concrete applications producing new products and developing new,

better, and lower cost production processes. Government has a vital role in sustaining this infrastructure – from supporting scientists and engineers to promoting basic research to assisting in the development of new, high-risk technologies with significant spill-overs.

- For policy-makers and University researchers this paradigm is very attractive and some would argue, self-serving.
- Does this paradigm admit the fundamental complementarities that form the foundation for the biotechnology revolution?

5.2 Alternative Paradigm – Non-linear, Chaotic R & D Processes

- Many analysts have documented the meandering flow of innovations into the economy.
- Casual observation and many case studies demonstrate that innovations emerge through a circuitous path.
- This path cannot be codified and, many would argue, is impossible to measure.
- An extreme variant of this view has been proposed by Terrance Kealey ("The Economic Laws of Scientific Research", McMillan Press, London, 1996 and Science Magazine, February 7, 1997, page 750)
- Kealey argues that innovation tends to drive basic science, not the other way around.
- This alternative paradigm blurs the distinction that governments often make between basic and applied science.
- As a result, it also blurs the boundary between the University and the outside world.

6. Challenges

6.1 Creating Institutions that Align Incentives

- Exploiting complementarities and structured fairness in sharing "the Gains from Trade"
- Appropriate mechanism design, recognizing core option values
- Design of exit options, as well as call and put options

6.2 Concrete Example of Novartis/Berkeley Research Alliance

- Through this alliance, we gain access to information technologies, databases, and gene sequences that exist nowhere in the public sector. This access allows us to fulfill our commitment to first-rate graduate education.
- We recently established a new program in Microbial Biology where extraordinary opportunities exist for fundamental discoveries over the course of the next century. Even though the college was able to secure the faculty positions for this new program, no infrastructure support or, more importantly, support for graduate fellowships and research assistantships were available from any source, including the campus, the state, or other public institutions.
- We desired access to intellectual capital that would not only complement our own, but allow us also to preserve and enhance our values and our culture.

This commitment resulted in our insistence on the unrestricted funding provided by the NADI agreement.

- We wanted to establish a public-private relationship which would allow the campus to capture a more significant portion of the value that is created by public research university/private company research agreements. As a result, we incorporated competitive economic principles, constrained by our public values and culture, in our selection of a partner.
 - We wanted to structure a collaboration that provided the private partner with no more effective rights than they would have if this agreement did not exist. The University must own the patents – the Intellectual Property. As a public research University, whatever we generate in the way of discoveries should be broadly available to the general public, including NADI. For this reason, the agreement allows NADI a first right to negotiate and then only for a portion of the discoveries that might emerge. Even without the agreement NADI would have a right to negotiate on all discoveries, just not the first right.
- 6.3 Value Added : Unique Intellectual Capital and the Direction of Complementarities Toward the Public Interest
- 6.4 Monitoring and Controlling Unintended Consequences
- Openness and transparency
 - Checks and balances through neutral peer review and evaluation
- 6.5 Potential Role of Public/Private Institutions in Aligning Interests to Exploit Complementaries
- Prisoner's-dilemma problems arising in technology stacking
 - Can patents deter innovation: The Anticommons in Biomedical research
 - Resent events: Merck's gift to Washington University
 - Joint venture between UC Berkeley, D.O.E., and Celera Genomics Corporation
 - Commodity interests: what game pieces, what intellectual capital, and what strategic position might they take in the unfolding research and development process.
 - One example is the role of US Corn Commodity Association in lobbying for a Congressional appropriation to plant genomics

Adoption of Agricultural Biotechnology in Latin America

Rod Townsend Ph.D.
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4/20/99

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1

Factors that promote adoption of GM crops by growers

- Availability of safe, well adapted products with demonstrable grower benefits;
 - reduced input and/or management costs,
 - simpler and/or more effective management,
 - reduced environmental impact,
 - improved yields,
 - increased crop value,
 - secure market.

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2

Factors that inhibit adoption of GM crops.

- Overly restrictive regulatory system
- lack of adapted products
- lack of information about product management and performance,
- concerns about environmental safety,
- uncertainty about food/feed safety,
- low consumer acceptance in key markets;
 - segregation and labeling requirements.

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3

Intellectual Property Protection

- Patent protection available for genes and methods in key Latin American markets (e.g., Argentina and Brazil), but no patent protection for plants,
- Plant Variety Protection in Argentina and Chile has recently become available in Brazil,
 - Will have significant impact on introduction of new varieties of improved non-hybrid crops (e.g., soybeans) into Brazil,
 - Increased private sector competition for government (EMBRAPA) breeding programs.

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4

Grower acceptance of products

- Current GM products with “input” traits represent value to growers in Latin America;
 - glyphosate resistant soybean,
 - insect protected (Bt) corn and cotton,
- technology is safe to use, simple and effective,
- reduces input costs and protects crop yield,
- reduces environmental impact,
- growers need to see benefits in their own operations,
- availability of adapted products limited.

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5

Export markets

- Consumer acceptance of GM foods is key factor in determining rate of technology adoption;
 - apparently good acceptance in U.S.
 - strong resistance in N. Europe (segregation & labeling),
 - uncertainty in Japan (labeling?).
- how large is demand by processors for GM-free grains and oilseeds?
- strong interest in GM-free contract growing,
- can Latin American countries capture markets by keeping certain crops and or regions GM-free (e.g., Australia GM-free for oilseed rape)?

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Argentina

- Leading the way on adoption of new technologies
- experienced regulatory oversight capabilities,
- many tests of GM crops,
- commercial approval for glyphosate resistant soybeans and Bt corn and cotton,
- planting of glyphosate resistant soybeans may reach 60% of total acreage this year,
- public research programs with GM crops.

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Chile

- Little interest in current commercial GM crops (don't grow soybeans and don't need Bt corn),
- important off-season location for seed production,
- well developed regulatory oversight for small scale plantings of seed crops,
- GM seed crops must be re-exported.

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Brazil

- Strong potential demand for new technology,
- system of regulatory oversight in place,
- number of small scale trials of GM crops,
- approved glyphosate resistant soybeans,
- coordinated blocking action by public interest groups opposed to technology (e.g., Brazilian Institute for Consumer Defense),
- concern about acceptance of crops in key export markets (e.g., Europe and Japan),
- public sector research on GM crops.

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Columbia, Uruguay, Venezuela and Central America

- Interest in GM crops (e.g., Bt cotton in Columbia),
- developing systems of regulatory oversight (Venezuela and Columbia),
- moving more slowly - looking hard at Argentina and Brazil,
- likely to be opposition from public interest groups in some countries (e.g., Latin American Declaration on Transgenic Organisms; Quito Declaration, January 1999).

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10

Conclusions

- The prerequisites are in place to insure rapid adoption of genetically modified grain and oilseed crops in key exporting countries in Latin America,
- likely to be short term delays due to;
 - availability of products adapted to the environment,
 - need to demonstrate benefits to growers,
 - actions by anti-biotech., public interest groups,
- key factor will be acceptance of genetically modified commodities in export markets of Europe and Japan and any associated requirements to segregate GM and non-GM crops.

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11

A FARM LEVEL PERSPECTIVE ON AGROBIOTECHNOLOGY

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It is a pleasure for me to be here this afternoon to offer a farm-level perspective on agrobiotechnology. In the next few minutes, I will address the following questions:

- How much have farmers benefited from first-generation agrobiotechnologies (e.g. herbicide resistant and insect resistant crops)?
- If tangible on-farm economic benefits from such technologies do exist, how sustainable are they?
- How much value will be created by second-generation agrobiotechnologies (e.g. quality-enhanced crops)?
- How soon will such value be delivered to the market?
- What will the farmers' value share be?

Let's begin with the first question whose answer is often clouded by the significant variation in the performance of first-generation biotechnologies. I will use here two different indicators to gauge on-farm economic benefits from these technologies. The first indicator is indirect and infers economic benefits from the response of farmers. The second is more direct and measures average economic benefits from technology adoption.

Farmer Response: A Look at Current Adoption Rates

Even the optimists among biotechnology proponents have been caught off guard by its extremely fast adoption rates at the farm level. In 1999, just four years from commercial introduction, almost 50% of the total US corn, soybean and cotton acreage will be planted with transgenics. To put this level of adoption in perspective, consider for example the adoption curve of Roundup Ready® soybeans against that of the most dominant agricultural technology of the past: hybrid corn. To make the comparison more pronounced, I have used the average adoption curve of hybrid corn for only Iowa, Illinois, and Wisconsin, which exhibited some of the highest adoption rates among different states. The comparison is revealing. In 1999, an estimated 55% of soybean acres will be planted with Roundup Ready® soybeans (figure 1). It took seven years for the selected states to reach similar adoption levels in the case of hybrid corn. In some states it took twenty years or more. Bt-corn, Roundup Ready® cotton and Bt-cotton also exhibit adoption rates significantly faster than hybrid corn (figure 2).

Economists tend to believe that people are rational, responding to incentives and potential opportunities. So, looking at these adoption rates, one should assume that opportunities must abound. This assumption is consistent with the slim empirical evidence available at this time.

University trials and impact studies across different agrobiotechnologies lead to the following two conclusions:

- There is tremendous variation in the yields and economics of first-generation agrobiotechnologies across time and space. Various location- and time-specific factors (e.g. weed and pest pressures) are partly responsible for this variation.
- *On average* there is significant value delivered at the farm level.

To put things in perspective, consider Roundup Ready® soybeans again. University trials and farm production data suggest that typically average Roundup Ready® soybean yields vary from 3 bu/a below to 3 bu/a above the average yields of conventional varieties. In many trials, there are no statistically significant differences in the yields of conventional and Roundup Ready® varieties. A farmer typically enjoys a net profit of \$10.00/acre - \$25.00/acre after all extra technology costs have been paid. The profits vary with specific cultivation practices and product pricing. Back-of-the-envelope calculations suggest that in 1999, the on-farm value delivered by Roundup Ready® soybean technology alone could range from \$400million to almost \$1billion. That's significant value and it does not even account for relevant environmental benefits from lower chemical loads or for the economic value of risk reduction associated with the technology. Similar calculations suggest that substantial value is being delivered through the rest of the commercial agrobiotechnologies as well. Given the value that is being delivered, adoption of first-generation agrobiotechnologies will likely continue to expand at a fast pace.

It may be argued, however, that on-farm economic benefits from first generation agrobiotechnologies are transitory. Professor Willard Cochrane taught us back in the 1950s that as long as farmers deal with technical innovation in commodity markets they are on a "technological treadmill. " The faster they adopt technology and increase supply the faster prices fall due to inelastic demand, ultimately resulting in loss of value. This may or may not be true in the case of agrobiotechnology. It is possible that most of the first-generation agrobiotechnologies are not strongly yield-increasing but instead input-reducing. In such a "no substantial yield increase" scenario, the treadmill effects may be small and relevant economic benefits may be sustainable.

Will second-generation biotechnologies deliver additional value in the future? And if so, how much? Corn, soybeans, canola, sunflower and other crops are being genetically modified to have improved qualities that match the needs of feeders and food processors or provide direct health and nutritional benefits to the consumer. More exotic technologies that turn plants into protein factories are also being advanced. Several presenters in this conference have discussed the truly exciting technologies slated for commercial introduction over the next several years. They also expressed their optimism about the value that such agrobiotechnologies will deliver.

Fundamentally, the optimism about the value of such technologies results from simple economic principles. Segmentation of a commodity market into a new sub-market where previously unmet end-user needs are satisfied and a residual commodity market, result in higher total market value. If the commodity market has an upward supply function then both the specialty and the commodity market benefit from the segmentation. In addition to creating value, such segmented markets are less vulnerable to the technological treadmill phenomenon as demand is typically

more elastic. Given the large number of crops that are being genetically modified, the product attributes being created and the potential end-uses that exist, the possibilities for significant decommodification of agricultural markets and sustainable value creation are extremely positive.

A key question then is how soon will such value be delivered to the market? Unlike first-generation agrobiotechnologies, which fit existing systems with few or no adjustments, second-generation biotechnologies require many. Most importantly, end-users must reach a level where they are able to appreciate and take advantage of the value created by quality-enhanced crops. Feeders, through feeding trials, must experiment with and align these technologies with genetics. Processors must learn how to leverage quality enhancements and build additional value around them. Consumers must learn to recognize the products and to correlate nutritional benefits and value. Other parts of the system must also adjust. Crop merchandisers, for example, must learn how to effectively segregate quality enhanced crops and how to optimize identity preserved supply chains. And so on.

The higher the investments required for the commercialization of quality-enhanced crops -- whether in learning or physical infrastructure-- the slower market penetration will be. To be sure, there is significant innovation and investment taking place in all parts of the supply chain at this time. Feeders and integrators are experimenting with a variety of quality-enhanced crops and animal genetics. Significant investments are being made in information systems for the creation of virtual markets and management systems appropriate for identity preserved supply chains. Most elevators expect that within five years 25% of their turnover will come from quality-enhanced crops and are either preparing for or carrying out relevant investments in storage suited for identity preservation. And so on. All these investments are in line with the high prospect values of second-generation biotechnologies. Nevertheless, they also suggest that market penetration of such technologies will likely be slower than that of the first-generation.

The final question we need to answer then is how much value will the farmers capture from second-generation agrobiotechnologies? An answer to this question is by necessity speculative. What is clear at this time is the lower bound of such value. Since farmers can always choose to produce commodities, quality-enhanced crops must deliver value at least equal to that delivered by commodities. And since as I argued before commodity markets will also benefit from market segmentation, farmers will, at minimum, capture value equal to the boost of the commodity market. Beyond that, and given that value from quality enhanced crops is distributed through up-front conjecture and negotiation across the supply chain, individual assets brought to the negotiating table by each player will likely determine value distribution. Hence, the relative negotiating position of individual farmers in each supply chain will likely determine their share of value from second-generation agrobiotechnologies.

Let me then close with an observation. The increasing value share of knowledge inputs in agriculture is unmistakable. Agrobiotechnology is currently leading this structural transformation. Precision farming, the Internet and other knowledge assets will only strengthen the trend over the next few years. Farmers may be in a position to claim a larger share of the value created by agrobiotechnology by actively participating in the knowledge transformation of agriculture. But that's a topic of another presentation. Thank you.

FIGURE 1

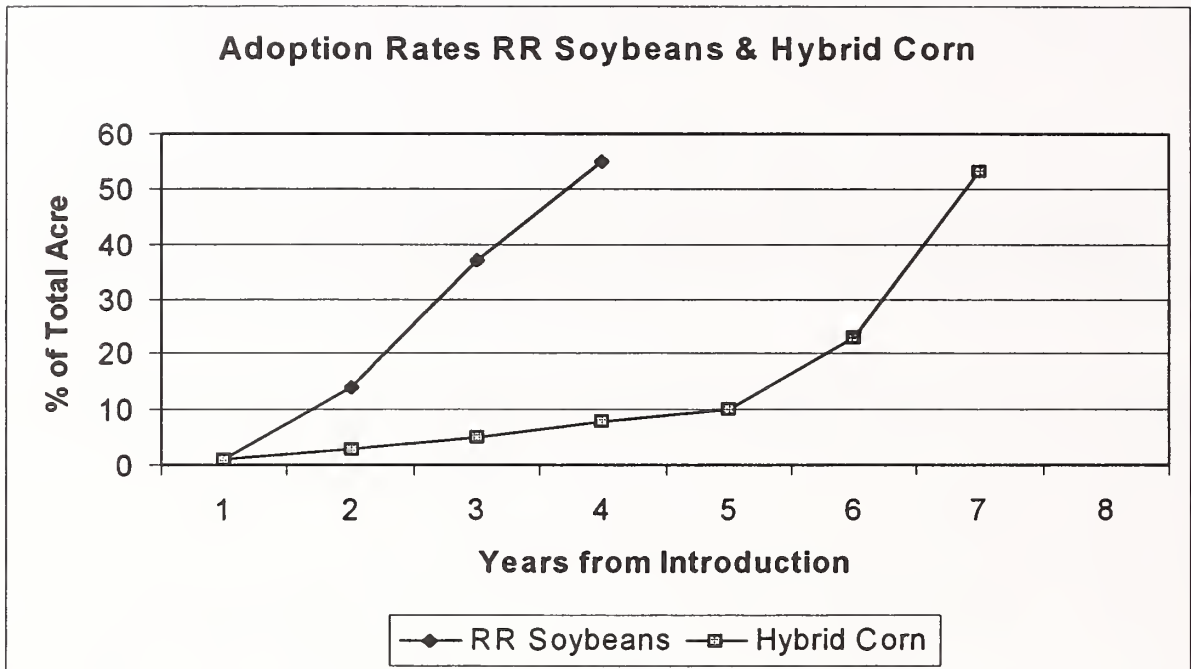
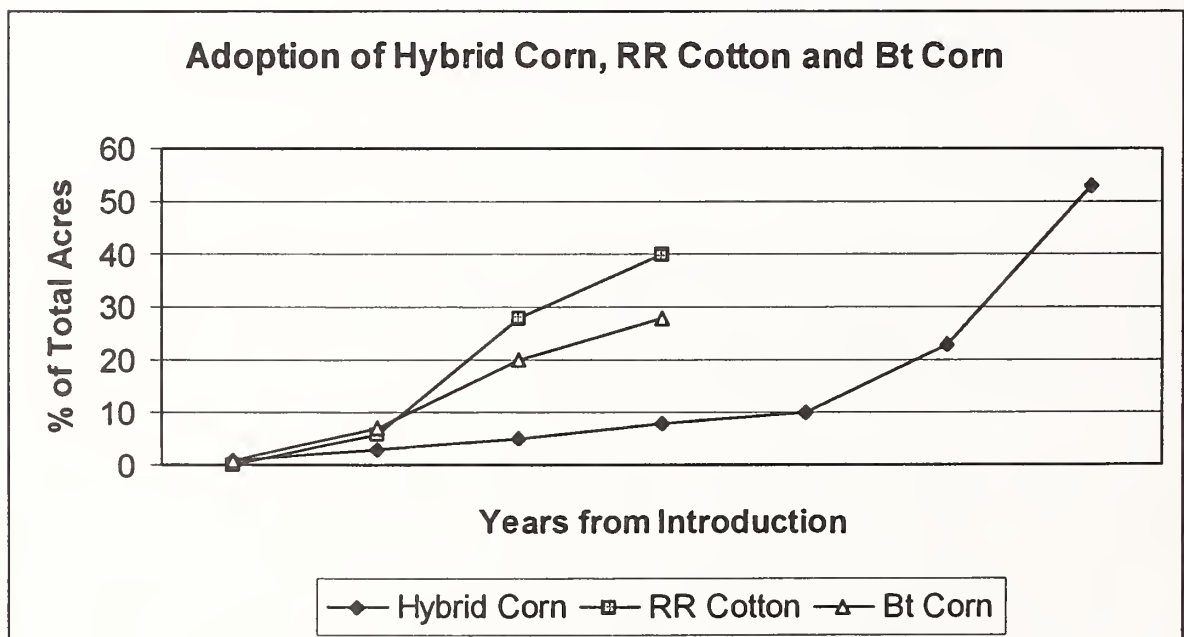


FIGURE 2



PRECISION AGRICULTURE: AN INFORMATION REVOLUTION IN AGRICULTURE

Pierre C. Robert
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The increase of agricultural productivity can be seen as a continuum. However, there has been major steps in the historical progress made by agriculture. The last most significant advances corresponding to the introduction of the tractor and associated machinery, followed by agrochemical and hybrid seeds. They brought very significant increases in farm productivity.

Recently, a major new step has been accomplished. Cochrane (1993) indicates that "farming in America began to cross another watershed in the 1980s.... in which the steps in the production process will be fully integrated and the entire process strictly controlled". "The essence of this mature industrial age of agriculture is CONTROL - control over the input of resources into established processes or into new and improved technological processes".

From the mid 1970s into the early 80s, a better awareness of soil and crop condition variability within fields developed from better field investigation methods including soil survey, soil sampling, aerial photograph, and crop scouting. Indeed, in the late 1970s, CENEX, Farmers Union Central Exchange, Inc., and the computer company Control Data Corporation, both based in the Twin Cities, Minnesota (MN), started a joint venture called "CENTROL - Farm Management Services" (D. Fairchild, 1988). The objective was to use more information on soil and crop conditions for each field during an entire growing season to improve management and farm profitability. CENEX developed a network of Agricultural Consultant Services while Control Data was responsible for information management and the development of farm databases. An important outcome of this program was a much better awareness of soil and crop variability within field and potential benefits of management within fields by zones rather than whole fields. This and the commercialization of the first microcomputer resulted in the decision to build a spreader capable of changing on-the-go the blend and rate of fertilizer. The project was initiated in the early 1980s by SoilTeq, Waconia, MN. The first commercial VRTs (Variable Rate Technology applicator) were used in 1995 by CENEX in Renville, MN and Quincy, Washington State. Microcomputers made possible, the development of farm equipment computers and controllers, the production of site specific management maps using geographic information system (GIS), the electronic acquisition and process of spatial field data to build farm geographic record keeping systems, the positioning of machines using global positioning system (GPS), and the development of the first sensors.

This was the beginning of a new agricultural management concept called "Farming by Soil Types", presently generally called "Precision Agriculture" (PA). Quickly, it generated a strong interest mainly because of associated new technologies, the concept makes good sense, and it offers new

routes for ag-industries and ag-businesses. Today, it can be said that the PA concept has been considered worldwide for most common cropping systems and some specialty crops.

After great excitement on the technological aspect, it is now realized that PA is not just the injection of new technologies but it is rather an information revolution, made possible by new technologies. The most critical development was the capability to electronically, on-the-go, record spatial data about soil and crop conditions. In the past, most farmers had very little information about crop management. If any, data were more likely for accounting purposes, not agronomics. Now, the spatial information is the base for significantly improved crop management –improved risk management. It is starting a new revolution helped by technology: PA is an information technology revolution. It has happened in manufacturing industries years ago, more recently in food retailing, and now it is entering agriculture.

Presently, precision agriculture is still much in infancy. PA is a holistic agricultural system but, today, only a few parts of the whole system are available. Adoption of PA practices is still at a early stage. A survey send to agricultural retailers in the U.S. is based on a sample of dealers already offering PA services (leaders) and a second more random survey (Akridge and Whipker, 1998). The survey indicates that adoption by growers of PA practices is still limited. Growers uses of PA services from the leader sample are soil sampling with GPS (40 %), field mapping with GIS (31 %), and yield monitoring (26 %) (Table 1).

Table 1. Growers use of PA services in 1998: precision leaders vs. random dealership sample

Grower use of	DEALERS	
	Precision	Random
Soil sampling w/GPS	40 %	8 %
Field mapping	55 %	29 %
Field mapping w/ GIS	31 %	6 %
Yield monitor	26 %	14 %
Enhanced seed	70 %	52 %
VRT: manual	20 %	18 %
controller (single)	20 %	7 %
controller (multi)	19 %	4 %

(From: Akridge and Whipker, 1998)

However, the survey shows that a large group of dealers are progressively offering PA services. The most common PA practices offered by leader dealerships are (Table 2): soil sampling with GPS (82 %), site specific agronomic interpretations (77 %), field mapping with GIS (74 %), yield map analysis (61 %), and variable rate applications of fertilizers with a simple controller (59 %).

Principal barriers for adoption of PA by growers are cost (49 %), attitude-slow adopter (41 %), new skills (21 %), and cropping system (11 %) (Table 3).

Table 2. PA services offered in 1998: precision leaders vs. random dealership sample

Services	DEALERS	
	Precision	Random
Custom application of: - fertilizer	65 %	40 %
- pesticide	55 %	40 %
Others : soil sampling: - grid	80 %	26 %
- soil	28 %	35 %
survey	4 %	20 %
- none		
Precision : soil sampling w/ GPS	82 %	28 %
field mapping	88 %	34 %
field mapping w/ GIS	74 %	24 %
yield monitor: sale	38 %	8 %
yield map analysis	61 %	12 %
agronomic interpretation	77 %	22 %
VRA: manual	42 %	23 %
controller	59 %	17 %
(single)	31 %	7 %
controller (multi)		

(From: Akridge and Whipker, 1998)

Table 3. Barriers for adoption of PA by growers in 1998:
precision leaders vs. random dealership sample

Barriers	DEALERS	
	Precision	Random
Cost	49 %	42 %
Slow adopter	41 %	38 %
Cropping program	11 %	31
Management expertise	21 %	13 %
Other	4 %	11 %

(From: Akridge and Whipker, 1998)

Another survey, the 1996 Agricultural Resource Management Study (ARMS) studied the use of precision agriculture on farms planting any corn for grain production and provide some additional clues on adoption patterns (Daberkow and McBride, 1998). Table 4 indicates that younger and better educated farmers are more likely adopters. Non-adopters were directly associated with their education level: 62 percent with a high school or a lower level, 24 percent with time in a college, and 14 percent with a college degree. Adopters were more likely fulltime producers and the most frequent crop a corn-soybean rotation.

Table 4. Some characteristics of corn producers related to PA adoption
(1996 USDA-ARMS survey)

Farm operator characteristics	Adopters	Non-adopters
Age (years)	49	52
Age distribution: less than 50 yr.	69 %	48 %
Education: high school or less	37 %	62 %
attended college	35 %	24 %
completed college	27 %	14 %
Major occupation: farming	91 %	75 %
Other	9 %	25 %
Acres harvested by crop: corn	48 %	39 %
soybean	37 %	28 %
wheat	6 %	9 %
other	9 %	24 %

(From: Daberkow and McBride, 1998)

This is confirmed by a more recent survey executed in four North Central states (IL, IN, IA, and WI) to determine the level and factors influencing the adoption decision of PA practices (M. Khanna, et al., 1998). Table 5 indicates that non-adopters have a lower education level, no computer, less experience, a part-time occupation, and a smaller farm. Other conclusions on causes for non-adoption are:

- uncertainty on returns
- investments on new equipment and information acquisition systems
- lack of demonstrated impacts on yields

PA, based on detailed spatial information, will bring agriculture to a higher, more precise, farm management level. K. Olson, 1998, wrote: "with the increasing complexity of farming, the increasing risk farmers are exposed to, and the increasing pressure to lower production costs, the management is for improved information technology, greater information processing, and better decision aids". This requires very substantial efforts in R & D, particularly in the development of optimum site specific management practices and in educational programs at all levels: technical, college undergraduate and graduate, and professional.

Recently, agriculture related magazine articles have included remarks from PA producers and ag-dealers such as: "we have tools but we still haven't learned what to do with the data", "the more data we have, the better off we are", "progress will be made in stages", and "this is not a silver bullet".

Table 5. Characteristics of adopters of an advanced application technology

Characteristics	Farmers	
	Adopters N= 144	Non-adopters N= 610
Less than 50 years of age	48 %	42 %
Less than High School education	38 %	54 %
Less than 25 years of experience	42 %	36 %
Full time	93 %	88 %
Ownership of a computer	68 %	41 %
Average farm size (ha-ac)	496-1226	308-760

(From: Khanna et al., 1998)

Recent surveys are showing that the infrastructure of PA services is developing and the adoption by producers of some practices is in continuous increase. Much R & D is in progress in universities, government agencies, and industries (Robert et al. 1998). But needs are important, as highlighted by the 1999 NCR-180 Site-Specific Management Agricultural Experiment Station research committee survey, in engineering technology, management,

understanding of natural condition variability, profitability, environmental protection, and technology transfer. The most frequent research topic needs were ranked as follow:

1. Development of real-time sensors for soil and plant characterization
2. Remote sensing techniques for soil and crop condition detection, and management
3. Quantification of PA impacts on the environment
4. Development of protocols for sampling procedures
5. Economics of PA practices
6. Quantification of spatial and temporal natural resources variability
7. Methods for data analysis and interpretation
8. Understanding relationships between yield, natural conditions, and input variables
9. Development of practical crop models for PA management
10. Development of improved spatial data analysis methods
11. Development of yield sensors
12. Methodologies for developing soil and crop SS prescriptions
13. Development of educational programs

Agricultural history shows that any significant technological enhancement of agricultural management took much development, education, and time before used by a majority of producers. It took, for example, more than 30 years to see tractors fully utilized. A similar course should be expected for precision agriculture, a holistic system requiring substantial new tools and skills. Precision agriculture - information technology - is the agricultural system of the future because it offers a variety of potential benefits in profitability, productivity, sustainability, crop quality, food safety, environmental protection , on-farm quality of life, and rural economic development.

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Site-specific Crop Management: Filling Critical Gaps

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Background

For the past eight years I have conducted a basic and applied research program focused on helping farmers and consultants with pest management decision making. Much of this work was conducted on-farm. Having been trained as a research scientist in a research station environment I was surprised to learn that questions that hadn't been apparent to me on the research station often were critically important to farmers in their production fields. It was through this on-farm research that I came to appreciate the importance of soil, landscape position and pest infestation level variation on crop fitness. Our work and the work of other on-farm researchers revealed that weed management outcomes are density dependent. In addition, under the right suite of conditions, chemical weed control and crop tolerance to this practice can be highly dependent on variation in soil physical and chemical properties. Beyond our work in weed management, it was also clear that discipline oriented scientists like myself need to think broader than their own discipline as farmers are working with complex integrated cropping systems. The economic benefits associated with geospatial and information technologies must therefore be sought through integrated systems. It is also important to ask who realizes these economic benefits. Over the past 80 years farmers have received a declining share of the ag sector dollar (Smith, 1992). It is important that a significant proportion of the economic benefits realized by site-specific crop management remain on-farm.

Use the data we have

Develop a broad platform with existing data. The Federal Government has a rich resource in the Soil Survey Geographic Database (SSURGO) and other data resources. At times this resource has been dismissed because it has been stated by some to lack the necessary spatial resolution for precision agriculture. It is my view that this database is a rich resource for site-specific crop management and efforts should be made to enhance this existing data resource rather than dismiss it. It is also obvious that this data resource is largely under utilized and is unknown to many growers. Efforts to make such data more accessible is the necessary first step in providing an existing landscape database for growers. The database can be enhanced by adding newly collected data to the SSURGO database.

Couple explicit data with the farmers' implicit knowledge of the land. I have co-taught a Site-specific Crop Management course in which most of the students in the course intend to return to their family farm. This teaching experience coupled with interactions with growers across the midwest has convinced me that a user-friendly SSURGO derived data visualization tool

(with limited analytical capability) is needed for growers and consultants. Farmers and students intending to return to the farm have asked for a geographic information system that would enable them to manage yield map and soil sample data (explicit data/knowledge) but of equal or greater importance would enable farmers to capture their impressions of how fields perform with a particular interest in temporal variation. For example several students in my course pointed out that many families have two and three generations of experience working the land. Through this experience knowledge about land-leveling flooding frequency and pattern, yield performance etc. has been observed for 40-60 or more years. The spatial resolution of this implicit knowledge about the land may not be as fine as the recently collected yield map however the temporal resolution would be far greater. Knowledge about crop management outcomes over a broad range of weather events (temporal resolution) coupled with historic management practices could greatly enhance our ability to derive meaning from currently collected soil and crop performance data.

The need for robust on-farm treatment designs

The farm as laboratory. A question commonly asked by site-specific farmers is “I’ve collected data for several years now and want to know what management changes are possible to improve my bottom line?” It is my opinion that we’re not as far along toward answering this question as we should be. I believe the lack of clarity toward answering this question is the result of two things. First, that temporal variation has a greater influence on crop management outcomes than was previously thought. Second, we have not been very good about designing on-farm experiments in order to derive meaningful local recommendations. Design of these trials must be robust enough to derive locally relevant treatment response functions. In addition, more must be done to define the local inference space or zone of similarity around a farmstead then conduct on-farm trials to derive integrated cropping systems recommendations.

Facilitating data sharing. Following on the *farm as laboratory* theme discussed above, farmers sharing data with neighboring farmers could lead to new ways of deriving locally relevant recommendations for crop production practices. While it is obvious that no two farms are alike Peter Hildebrand points out “farming systems or portions of the system are similar in important characteristics. These systems or subsystems can be grouped into homogeneous systems or recommendation domains which provide a convenient means for developing location specific technologies”. The National Research Council panel study evaluating *Precision Agriculture in the 21st Century* concluded that subfield and field level data could have additional value beyond the individual farm but that policies, methods, and practices to facilitate data sharing are needed. It is my view that there is great potential in seeing farmers working collaboratively with trained facilitators cooperatively conducting on-farm experiments to define inference space and recommendation domains for crop and natural resource management practices.

Education Opportunities

Land Grant universities are struggling to meet the educational needs of agricultural practitioners; this is particularly true in rapidly developing agricultural fields like site-specific management and transgenic crop technologies. For the first time companies like John Deere and Monsanto are offering their own courses or are co-teaching courses with the Extension Service in these rapidly developing

fields of science. The concern is whether the courses are truly objective. More support is needed to help the Extension Service be more responsive to new developments in agricultural practices.

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PRECISION AG: PAST, PRESENT, FUTURE

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CENTROL Crop Consulting

Last week a farmer called me and wants to fertilize this year's wheat according satellite images that we have from last year's sugarbeets. It surprised me that this grower would be asking for this type of application. We looked at using the imagery to give nitrogen credits for the greenest sugarbeet leaves and it should pay for him to do this. Even in this poor economic climate growers continue to show a desire and are thinking of ways that Precision Ag can work on their farm. In our area there are 10% of the growers that are "biting at the bit" and want to do some type of Precision Ag no matter what, 40% say they will do it when they are convinced that it can pay (like this grower that I mentioned), and 50% of the growers hope that they are retired before it becomes necessary. Precision agriculture is different than conventional agriculture, because it attempts to put the appropriate inputs only on areas that need it, rather than treating whole fields according to the field average. This can give Agronomic, Economic and Environmental advantages over conventional agriculture. Another benefit is that it can quantify the "gut" knowledge that often is not passed on from generation to generation.

CENTROL of Twin Valley's trade territory centers on the Red River Valley of the North, on the border between MN and ND. This valley is the bed of an ancient glacial lake called Lake Agassiz. It is very flat (1 foot of drop per mile) and is about 250 miles long and 50 miles wide. The Red River drains north, into Hudson Bay, and often causes spring flooding as the ice upstream (to the south) melts while there is still ice downstream (to the north). The sediments from the glacial lake and ancient flooding have given a very high natural fertility, and very uniform soil types.

CENTROL of Twin Valley is a crop consulting company that works with more than 500 farms year-round, helping them make better decisions. Our services are not tied to sales and involve all aspects of crop production, including crop monitoring and field specific recommendations, soil sampling and plant food recommendations, crop planning, and precision ag technology. In 1998, we consulted on 675,000 acres and soil sampled over 1.3 million acres. Our major crops are wheat, soybeans, sugarbeets, corn, dry edible beans, barley and sunflowers. We are presently experiencing a major shift in acres from wheat and barley to soybeans. In the Red River Valley, the main type of Precision Ag is grid soil sampling on sugarbeets. We also do zone sampling, topography aided sampling, satellite-imagery aided management and yield map management, but most of it focuses on nitrogen management in sugarbeets. This is because the process is straight forward and the payback is quick. We are also concentrating on other types of Precision Ag, with a longer term payback and yield monitors will be a large part of that.

At first we thought that our soils are too uniform for grid sampling to pay. But, we've found that even in our "uniform" fields the variability of soil nutrients is very high. Nitrate variability of more than 100 pounds in the same field is common.

1993 Field Data

What kind of variability are we talking about?

Adjusted N test and (N Recommendation)

Average Adjusted N Soil Test = 90 (30)

16 (104)	19 (101)	321 (0)	702 (0)	28 (92)	12 (108)
18 (102)	26 (94)	82 (38)	234 (0)	14 (106)	18 (102)
52 (68)	14 (106)	16 (104)	10 (110)	17 (103)	18 (102)

What kind of profit can we expect by variable rate nitrogen applications in sugarbeets? Four years of university research show that grid sampling and variable rate spreading of the nitrogen fertilizer give an average net increase of \$64 per acre.

Summary of grid data on sugarbeets

(What kind of dollars are we taking about?)

Difference between grid and conventional

Year	1994	1995	1996	1997
Tons	+0.94	+1.21	+2.60	+1.53
% Sugar	+0.40	+0.33	-0.08	+0.29
% LTM	-0.04	-0.11	-0.03	-0.01
Rec.sugar/ Acre	+434	+573	+748	+603
Net/Acre	+\$72	+\$48	+\$70	+\$67

Larry Smith - University of Minnesota @ Crookston

It is this kind of profit potential that is driving our precision ag. This \$64 increase in net profit is caused by the effect that nitrogen has on yield and sugar. High soil nitrogen will often increase tons harvested, but will decrease both % sugar in the beet and the recoverable sugar per acre. With the high quality payments at our sugarbeet co-operatives there is a strong incentive to apply enough nitrogen to optimize yield, but the goal is to have nitrogen deficient beets in late August and September. A yellow field in September is an indication of a high sugar field, which is usually more profitable than a green colored, high tonnage field.

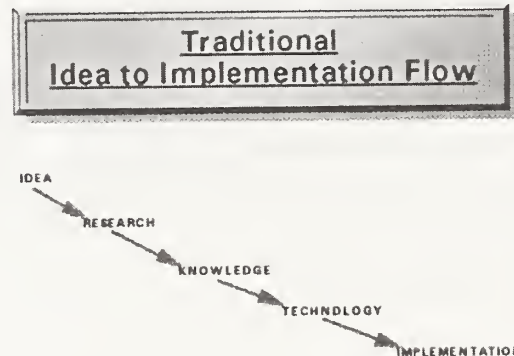
Our grid sampled fields increased dramatically in 1995 and we are now at a plateau where we are taking a deep breath and analyzing where Precision Ag works and where it doesn't. We are doing a better job of selecting the fields through previous crop, history, experience and conventionally pre-testing the fields before gridding.

Where are we now?

While Precision Ag is revolutionary, it is also the natural evolution in the use of technology to farm better and it will increase. We went from applying manure to fields in the 50's, to applying the same plant food across the whole farm in the 60's, to applying specific blends of plant food to different fields in the 70's, and we are now applying plant food to specific parts of fields in the 90's.

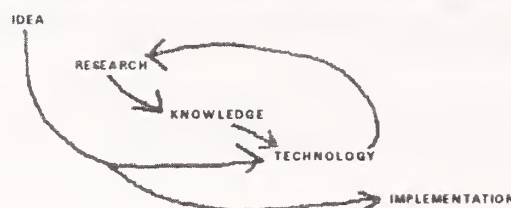
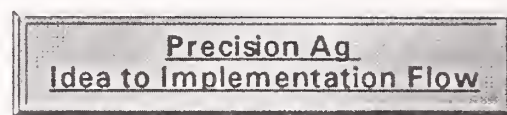
One of the confusing issues with Precision Ag is the way that it has advanced. Most technology advancements, regardless of industry, go through a sequence of steps.

1. Someone has an idea
2. Research is done on that idea
3. Knowledge is obtained from the research
4. Technology is the result of knowledge
5. The technology and knowledge are implemented



Precision Ag can be very frustrating because it bypassed the Research and Knowledge parts of the equation.

1. The idea of Precision Ag and Variable Rate Technology (VRT)
2. Technology to do VRT was available
3. Precision Ag was implemented
4. Now we are in the process of doing the research and gaining the knowledge that will further drive Precision Ag.



With this "flip-flop" of the idea-to-implementation flow, we now need to do the research and knowledge and learn where Precision Ag works.

In our area the poor ag economy is holding Precision Ag back even though it is often profitable, due to cost cutting and expense minimizing. Even with the average profit of \$64, a small % of our sugarbeet acres are variable rate spread.

In 1999, we will do other types of Precision Ag, including topography sampling, pre-sampling, aerial photography, satellite imagery, beet top credits for the following crop, yield maps and management zone sampling. There are many types of Precision Ag tools that need to be looked at, but there is not a single "right way" that will work on all fields.

Where is it headed?

I am a poor futurist. Our 5 year plans have not been very accurate. Some years Precision Ag grew faster than we planned and now it is growing more slowly. But, it will continue to increase and be used in ways that we haven't even thought of yet. There is a quote attributed to President Eisenhower: "Plans are useless, it's the planning that is important." This quote is especially appropriate for CENTROL and me. Even though our plans may change depending on the current situation, having gone through the planning process allows quick, knowledgeable, flexible decisions when conditions change.

The Paradox of Precision Ag

1. Precision Ag is revolutionary, yet evolutionary.
 - There will be many small increases and large innovations.
2. More on-the-farm research, and more small plot research.
 - There will be field scale research with yield monitors, but there will also be more emphasis on testing of multi-disciplinary interactions in small plots.
3. Cost of Precision Ag will decrease, and benefits will increase.
 - GIS will help define management zones that can be treated similarly.
 - We will find new types of data that will be more valuable.
4. Growers will do Precision Ag themselves, and they will hire consultants.
 - A grower with the aptitude and time may do it himself, but others will hire a consultant to help them. Some growers will use a consultant as well as do it themselves, but most growers will lean one way or the other.

5. There will be more large farms, and more small farms.
 - There will be fewer mid-size farms.
6. Good farmland will increase in value, while poor farmland will decrease in value.
 - When the profit can be tracked on a field by field basis, there will be more variation in the value.
 - When profit can be tracked unproductive parts of fields may be switched to non-crop uses.
7. More data will be collected, and it will be more transparent and seamless.
 - There will more automatic sensors and data loggers, that will be standard equipment.
 - There will be more use of remote sensing.
8. More pooling and sharing data between farms, with less free exchange of information.
 - The data will have more value as it is compiled with other farms, rather than using alone.
 - The data ownership issues will continue to be confusing and will probably be settled in the courts.
 - There will be marketing of data and people paying for it.
 - Some people are saying that the data will be worth more than the land? Will this be possible?
9. Crop models will improve, “expert systems” will struggle.
 - The crop models that we have now will improve as we obtain more data.
 - “Expert systems” that attempt to quantify the data and actually make the decision will be replaced with systems that supply compiled data and information to be used by growers and experts to make decisions.

NAICC Precision Ag White Paper

A White Paper is available from the National Alliance of Independent Crop Consultants. It is available through Allison Jones at NAICC Headquarters (JonesNAICC@aol.com, 901-861-0511) or through Dennis Berglund (dberglund@centrol.com, 218-584-5107). If you are interested in Precision Ag, I would recommend that you request it.

Close your eyes and dream

I'd like to close with an example of where I think it may go. The Precision Ag of the future will implement financial and marketing along with decision making and agronomics. A grower will do a confidential Business Plan including cash flow, fixed asset plan and crop plan and submit anonymously via the internet. A search of lenders will be done automatically. Lenders and input suppliers will bid interest rate, payment schedule and loan amount according to their preset standards. Grower can respond to a hot link for more information, and qualify for the loan directly on the computer. The grower and consultant will do the crop plan that will forecast the inputs needed. This info will also be submitted on the Internet in confidential form. A search of input suppliers will be done automatically. Interested suppliers will send a bid for plant food, and other inputs needed along with services offered. There will be hot links that say “Click here if you want a bid on 200 tons of urea delivered April 1st”, etc. Or 20 gallons of a specified product. This will force a “fair value” for products and has important implications for local dealers and distributors and suppliers. There may be messages that pop up and say: “The North 40 may benefit from a specific type of Precision Ag according to history and current crop plan. Click here to find out more.” The grower could sign up the field for grid sampling, variable rate spreading, or some other type of Precision Ag without a face-to-face meeting or even talking to the other party.

There will always be choices, and the farmer will always make his own decisions. Even though much of the communication isn't face-to-face, the personal relationships and trust will become even more important than they are now. Time will be saved, efficiencies gained, and suppliers and grain buyers will need to give the grower "fair value". Using a hot link, a grower may also send a question concerning a field's Precision Ag prospects to an expert and allow access to his field's data files that are stored elsewhere. As the crop is seeded there may be some automatic Precision Ag such as variable rate seeding, without human input, according to where yields were recorded higher or lower in past years and according to the forecast for the current year. There may be pre-emergence herbicides automatically spot-applied where weeds were recorded in previous years, again without human input. There will also be variable rate maps, that are made in advance according to agronomic decisions, applying plant food, pest control products, etc. automatically as planting is done. There may be different varieties or transgenic crops in certain areas of the field. (Nematode resistant soybeans, Aphanomyces resistant sugarbeets, high pH tolerant soybeans, and variable rate fungicide seed treatments are some examples.) Pests and weeds may be spot sprayed according to their unique remotely sensed "signatures", obtained either from a satellite, or from an optical sensor on the sprayer. We may even do spot spraying by airplane, which we used to joke about. Data will be logged of all field operations. Crop models will forecast yield on a field by field basis, according to interactions of temperatures, planting date, stress, moisture, etc. Buyers will follow the crop models and bid on the crop while it is still in the field, if it is not contracted yet. They will bid for I-P, transgenic or commodities without knowing the grower, until after acceptance of the contract. The buyer may even suggest management techniques that would help the crop qualify for certain premiums. During harvest, the yield monitor will upload data on a real-time basis, recording protein, yield, quality, test weight, moisture, etc. The consultant recommends that a spray for Cercospora is needed. The grower's operating loan limit may not allow a spray. According to the yield forecast from the crop model, the scouted disease levels indicate that the grower will profit from controlling the Cercospora. So.... Again after a search the interested lenders would send a hot link that says "Click here if you want the amount sent to your account."

While much of this will eventually occur at various levels, Precision Ag needs to be voluntary, and needs to benefit the grower, either in increasing profit, saving time, or reducing risk. So, like that grower that I mentioned at the beginning, each farmer will find ways to use Precision Ag in ways that he/she sees fit. The grower will be in the driver's seat. And, the art of farming will continue.

The Future of the U.S. Tobacco Economy

Fred Gale
USDA/ERS

Last November's tobacco settlement was followed by an immediate boost in wholesale cigarette prices on top of earlier increases that brought the cumulative price increase for 1998 to 50 percent. In recent months growers were hit with substantial cuts in tobacco quotas for the second year in a row, due to the double whammy of a deteriorating domestic market outlook and falling exports due to economic crisis in Asia and other overseas markets. ERS expects that higher cigarette prices and other factors could cut U.S. cigarette consumption by as much as 25 percent over the next 10 years.

The tobacco industry, with roughly \$50 billion in annual sales, accounts for an important chunk of the U.S. economy, so loss of tobacco sales can be expected to cause significant economic hardship and dislocation. Tracing the shares of the tobacco dollar and where those dollars go shows that most of the impact will be felt beyond the farm gate, by retail stores, manufacturers, wholesale establishments, transportation industries, and other businesses that supply materials and services to the industry. U.S. farms receive less than 3 cents of every retail dollar spent on cigarettes, but tobacco farmers and their communities are probably most vulnerable to declining tobacco sales.

Tobacco Farms and Rural Communities Are Most Vulnerable

Manufacturing, wholesale, retail trade, transportation industries, their employees, and businesses that supply them will feel economic pain, but most of those activities occur in urban areas where alternative opportunities are plentiful, especially in today's booming economy. Tobacco farms and their operators, on the other hand, have invested considerable amounts of capital, time, and other resources in tobacco-specific resources: equipment, greenhouses, curing barns, land, and expertise that cannot be easily redeployed to other uses. Tobacco farmers, who have an average of 20 years experience on their present farm, have accumulated considerable expertise in tobacco growing. With an average age of 54 years old, retraining doesn't make sense for most. In many tobacco-growing areas, profitable alternative farm enterprises are not available. On tobacco farms, tobacco outstrips all competing enterprises in returns per acre, especially on small farms. Tobacco communities may be vulnerable if they cannot replace lost tobacco spending at farm supply and equipment dealers, warehouses, and retail stores.

Declining tobacco sales will mean real economic hardship for thousands of people and dozens of communities, but this is a manageable problem. The number of people and communities who will be seriously impacted and the dollar value of their losses are relatively small, especially in comparison to the dollars that will flow to tobacco States through the recent tobacco settlement and the recently established growers' trust fund. The economic dislocation can be managed, but there are at least four tasks that must be completed to ensure that this happens.

- Identify the people and communities that will be hurt the most.
- Understand the various strategies that farmers and communities might pursue in response to declining tobacco income.

- Target assistance where it is most needed.
- Make sure assistance dollars are used wisely.

Growers and Communities are Diverse

Tobacco farmers and quota owners are a very diverse group. They vary in the size of their operations, the productivity of their land, and the nontobacco alternatives (both on- and off-farm) available to them. Characteristics are also strongly correlated with geographic location and tobacco type. Flue-cured farms on the coastal plain tend to be large, averaging 400 acres or more. They are relatively diversified, full-time farms with potential for expanding tobacco acreage. On the other hand, flue-cured farms in the Piedmont region of North Carolina-Virginia and most burley farms are smaller, more numerous, more dependent on off-farm employment, have little potential for expanding tobacco acreage. They are less likely to have a profitable nontobacco enterprise and more likely to have beef cattle. Various farms are likely to have differing strategies and objectives in response to changes in the tobacco market. A “one size fits all” approach to addressing tobacco farmers’ needs is potentially wasteful and ineffective.

Many tobacco-growing communities have experienced strong economic growth. Over the past several decades, the nonfarm economy in the tobacco region has grown steadily while tobacco (and farming in general) has remained stagnant, or declined. That means tobacco has decreased in economic importance. The ratio of gross tobacco sales to total personal income is less than 5 percent in most counties where tobacco is grown. But there are 88 counties with ratios over 5 percent, and 33 with ratios over 10 percent. These counties are the most vulnerable to loss of tobacco income, and many have few jobs, an aging population, and high poverty rates. The most vulnerable communities also tend to be the most likely to lose tobacco production--where productivity is low and farms are small. They are clustered in central and eastern Kentucky and in the North Carolina-Virginia Piedmont with a number in the Coastal Plain region.

Sharp Decline in Number of Growers is Likely

Tobacco growers and tobacco-dependent communities will choose various strategies to respond to the declining tobacco market. Some will stay in tobacco and try to increase productivity and acreage. Growers who have large efficient farms are the most likely to stay in the tobacco business. Many will try to expand acreage their acreage, especially if the program should be eliminated, to take advantage of economies of size and mechanization.

It seems inevitable, however, that a lot of people will quit tobacco growing in the coming decade. “Fewer, larger farms” has been the watchword in most types of farming and we’ve seen a lot of consolidation already in tobacco. The number of tobacco growers declined by two-thirds over the last 30 years while tobacco production stayed roughly constant at about 1.7 billion pounds. The number of tobacco growers fell about 30 percent between 1992 and 1997 alone. About one-fourth of tobacco farmers are 65 years old or older. The consolidation process will speed up if the tobacco program is eliminated. About 60 percent of tobacco growers harvested less than 5 acres of tobacco in 1997. Many of these very small operations may become nonviable with shrinking quotas and/or lower per-acre returns.

The 1997 Census of Agriculture counted 90,000 farms that grew tobacco, and 65,000 farms where tobacco was the primary crop. It is likely that at least half of these farms will no longer be

growing tobacco in 10 years. Those who are able to will retire. Some may stay in farming and pursue alternative farm enterprises. Some will pursue nonfarm employment or start a business. Each group will have different goals and needs. As States manage the funds flowing through the settlement and grower trust funds, they need to give attention to how they can aid the large number of growers making a transition out of tobacco.

Different Needs For Different Strategies

Growers who stay in the tobacco business will be interested in research and extension that could develop and disseminate new technologies and improved management and find alternative uses for tobacco. Marketing is another area where tobacco growers may need assistance in the long run. Some people anticipate an increase in contracting between growers and tobacco companies if the tobacco program is eliminated at some point. Contracting could also become more prevalent if industrial or pharmaceutical uses for tobacco are found. As we have seen in the poultry and hog sectors, contracting opens a range of issues for farmers. Growers may need advice on evaluating contracts and help in collecting market and price information.

Tobacco growers may try to develop on-farm alternative crops, livestock, or value-added enterprises. This strategy may be successful for some, but it is well known that other crops cannot match tobacco's per-acre returns. A few labor-intensive high-value commodities, including vegetables, some fruits, and exotic specialty crops can bring high returns, but the market for many of these is limited and widespread adoption pushes down prices. Tobacco growers need good, well-considered advice on the technical, marketing, and financing aspects of starting up new farm enterprises.

Many members of tobacco-growing households will seek to replace lost tobacco income with off-farm employment. This can be addressed through both supply- and demand-side measures: training and skill development and rural job creation. However, the average age of tobacco growers is 53 and 35 percent are at least 60 years old, so retraining for a nonfarm career is not always realistic. Many older farmers may continue to operate their farms, while those who are financially able to do so may retire. Older farmers need help with financial planning. Those who are not in a position to retire are the group most severely affected by declining tobacco demand and in need of income support.

Communities Need to Plan Carefully

Towns, cities, and counties in tobacco-dependent areas will also need to plan carefully to adjust to the loss of tobacco income. Some communities may seek to develop and encourage new agricultural enterprises. This could include encouraging agricultural tourism, opening a farmers' market, attracting a food processing plant, or promoting purchases of local produce by retailers and restaurants. Communities may need assistance in market evaluation, grants or loans for facility construction, advice on advertising and promotion. Regional collaboration among communities may be an effective way to pool resources.

Many communities may seek to develop or attract nonfarm industry as a job creation strategy. Tobacco communities have been very active in economic development and many have been successful. Southern communities have long relied on attracting manufacturing facilities, and this

will be an important component of development efforts for many tobacco communities. However, many experts argue that encouraging start-up of locally-owned businesses is a more effective approach to economic development.

This brings us to the concerns growers have about how funds earmarked for tobacco communities will be spent. Careful attention must be given to planning and overseeing use of settlement and growers' trust funds targeted to growers and their communities. States are taking steps to form commissions to advise governors on this process, but more needs to be done. Cooperation among States, alliances among tobacco communities, and cooperation among various Federal and State agencies that provide economic development assistance could bring more synergy to the adjustment process. There are several models of regional issue-specific development initiatives that could be followed, including the Northwest Timber Initiative, the Mississippi Delta Compact, and the Colonias Initiative, which addressed economic development needs in the United States' southern border region.

Conclusion

In summary, the tobacco industry faces momentous changes in the coming decade. There will be considerable economic pain and dislocation. The problem is a manageable one, however. The entities who have control over settlement and growers' trust funds need to give attention not only to the current economic pain tobacco growers are experiencing, but also plan ahead for the transition to a smaller, highly productive and efficient tobacco industry.

There are some 300,000 quota owners and 90,000 tobacco growers. Some of the quota owners are also growers, but we don't know how many. For the majority of people involved in tobacco, their income from tobacco is an important component of their household income, but not their sole source of support. For example, at a lease rate of 35 cents per pound the average owner of a flue-cured quota allotment would receive rental income of \$8,500 per year and the average burley allotment would bring \$1,225 per year. In 1997 more than half of principal operators of tobacco farms said farming was not their principal occupation and 38 percent worked essentially full time (200 days per year) off-farm.

While economic losses facing tobacco farmers and their communities are substantial, they are often overstated. While there are several hundred thousand people likely to be adversely affected by the loss of income from tobacco growing or quota rental, most of those people are only partially dependent on tobacco income. Similarly, many tobacco-growing communities happen to be adjacent to rapidly-growing sunbelt cities, which has reduced the local dependence on tobacco dollars.

It has been over thirty years since the government's initial warnings about tobacco's detrimental effects on health and restrictions on cigarette advertising, so weak demand for tobacco is no surprise. People have been sending out warnings about tobacco's poor prospects since the 1960's. Tobacco has had its ups and downs over the past thirty years, but the trend has generally been down. The newly released 1997 Census of Agriculture shows that the number of tobacco growers declined 28 percent between 1992 and 1997. In 1997 there were less than 90,000 farms growing tobacco, about one-third the number of growers 30 years ago.

Consolidation is one of the major trends in tobacco production that will continue into the next century. "Fewer, larger farms" has been the watchword in most types of farming and we've seen a lot of consolidation already in tobacco. While the number of tobacco growers declined by two-thirds over 30 years, tobacco production was about the same, at 1.7 billion pounds. Without the Federal tobacco program, consolidation would have been even more dramatic. The tobacco program essentially froze in place historical patterns of tobacco production by preventing transfers of quota across county lines, boosting the profitability of an acre of tobacco, and keeping small tobacco holdings viable. Without the program there would have been regional shifts in production and thousands of small growers could not have stayed in the business without the program's price supports. That means there is even more room for consolidation in tobacco growing.

The recent decline in quotas may speed up consolidation. As each grower's quota (and therefore his or her gross income) shrinks, those who have large fixed obligations to pay, such as interest payments on machinery or land purchases, will be looking to acquire more quota. This will push up quota rental rates, and more growers, especially smaller operators, will probably rent out their quota. The consequence is fewer, larger tobacco growers. If the tobacco program and its quota system were eliminated, consolidation and regional shifts in production would occur, bringing about dramatic changes in the structure of the industry. Flue-cured acreage would tend to move from piedmont to low-cost coastal plain areas where growers can expand acreage and take advantage of size economies. Burley acreage would move out of high-cost mountain regions and extremely small holdings would decline in number.

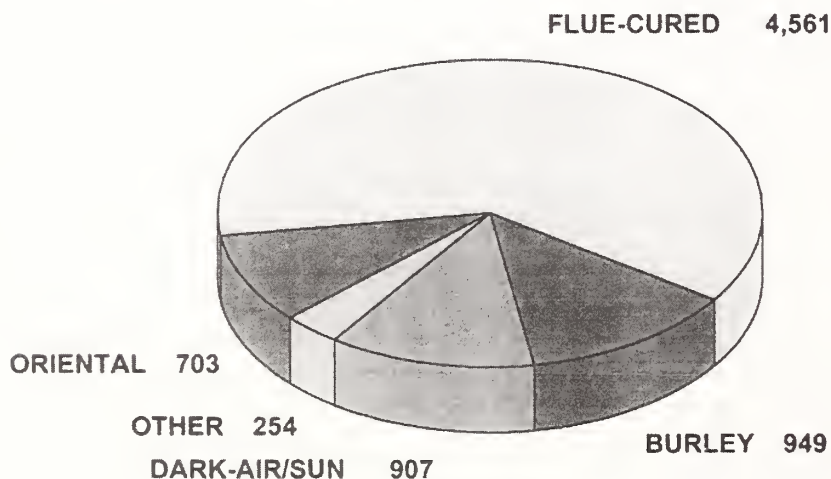
"World Tobacco Situation & Outlook"

DAN STEVENS
SENIOR TOBACCO ECONOMIST

Farm Service Agency &
Foreign Agricultural Service
United States Dept. of Agriculture

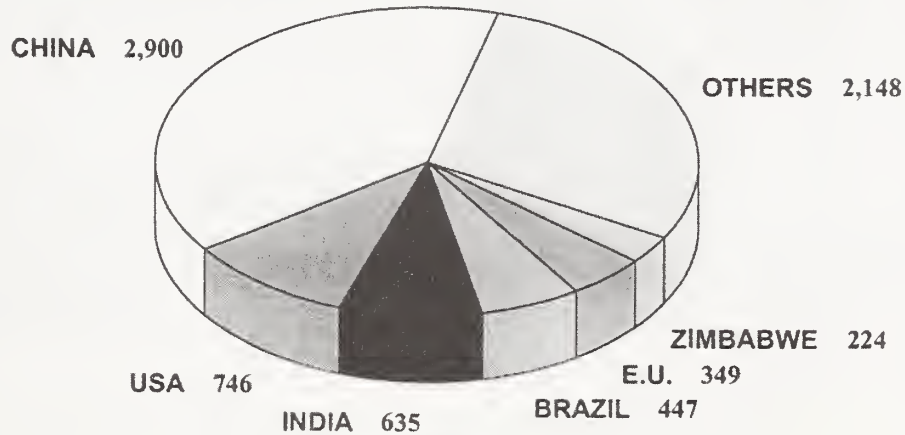


1998 TOBACCO PRODUCTION



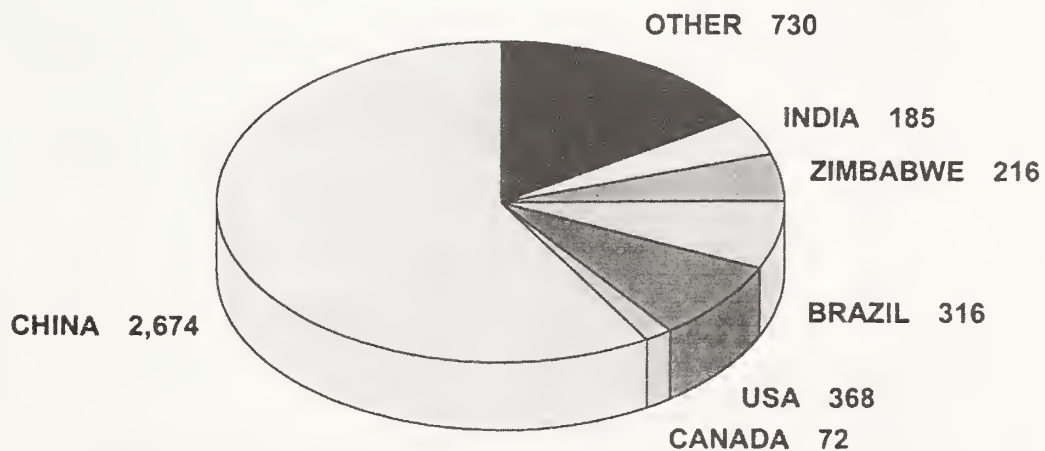
7.4 MILLION TONS

WORLD TOBACCO PRODUCERS in 1998



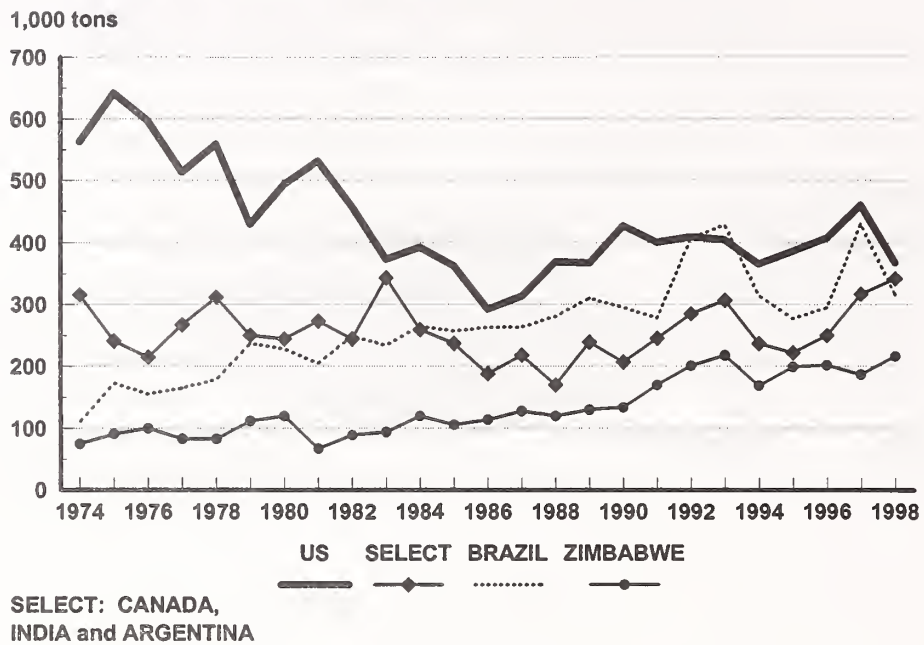
7.4 MILLION TONS

1998 FLUE-CURED PRODUCERS

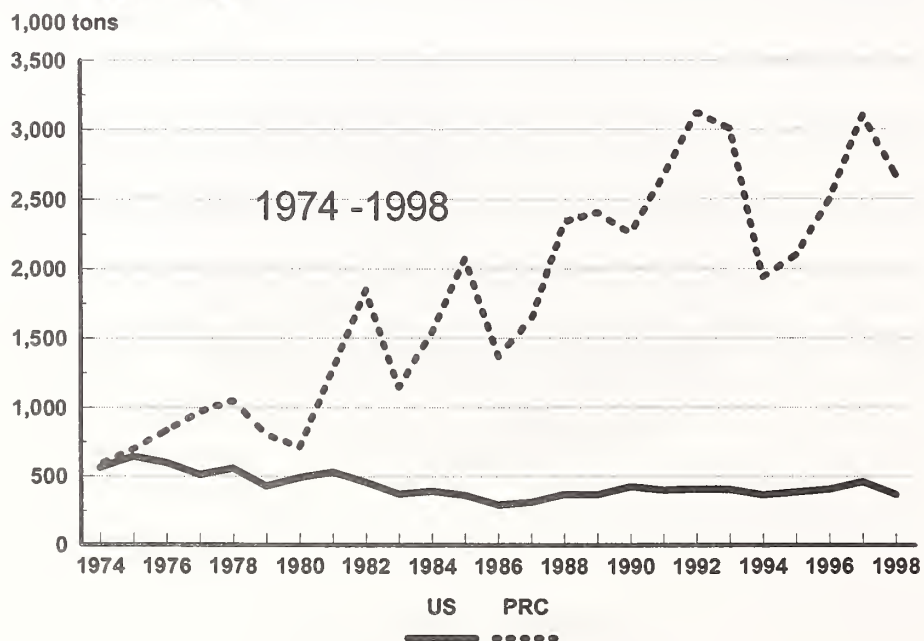


4.6 MILLION TONS

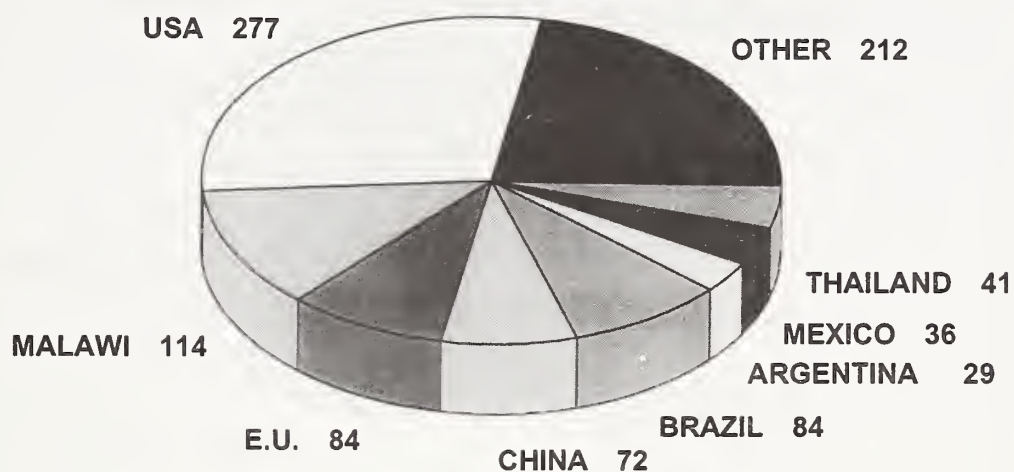
FLUE-CURED PRODUCTION



FLUE-CURED PRODUCTION

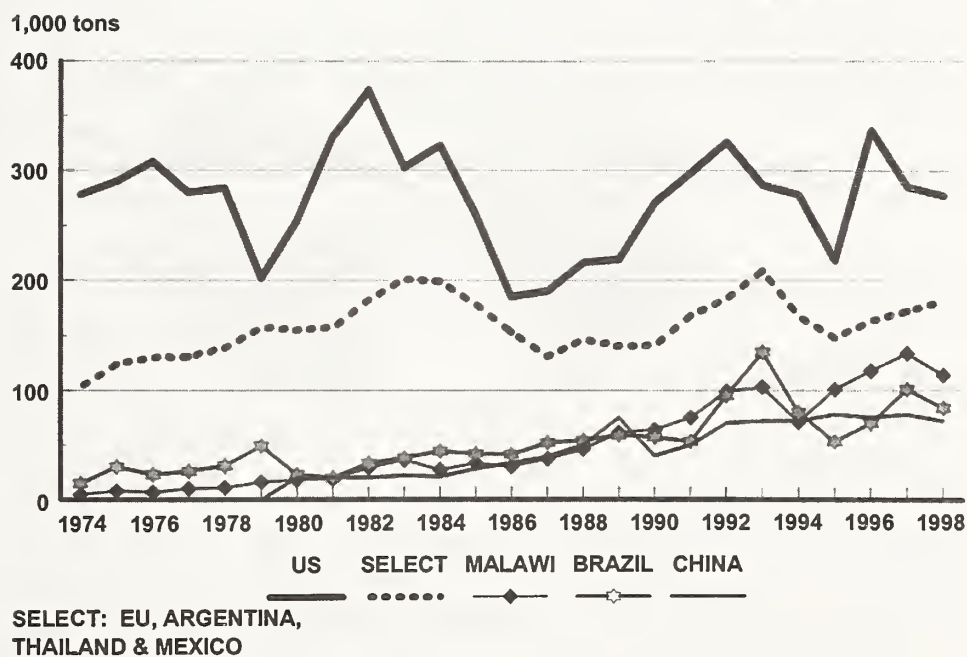


1998 BURLEY PRODUCERS

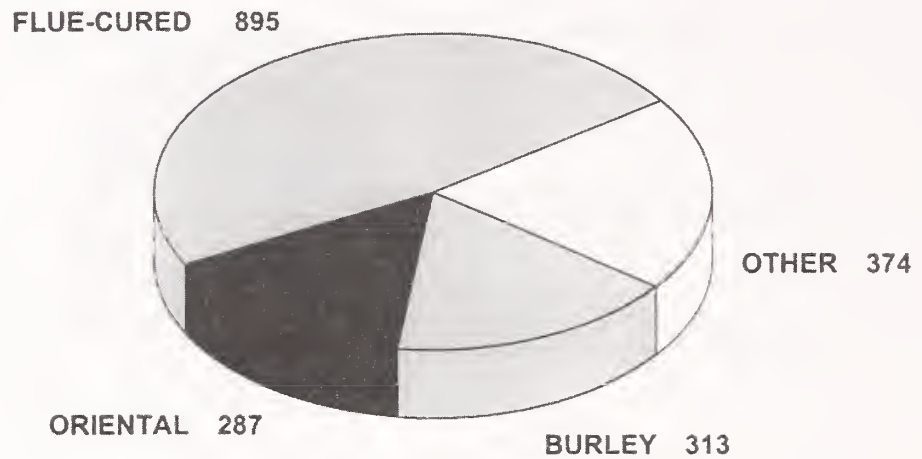


949,000 TONS

BURLEY PRODUCTION

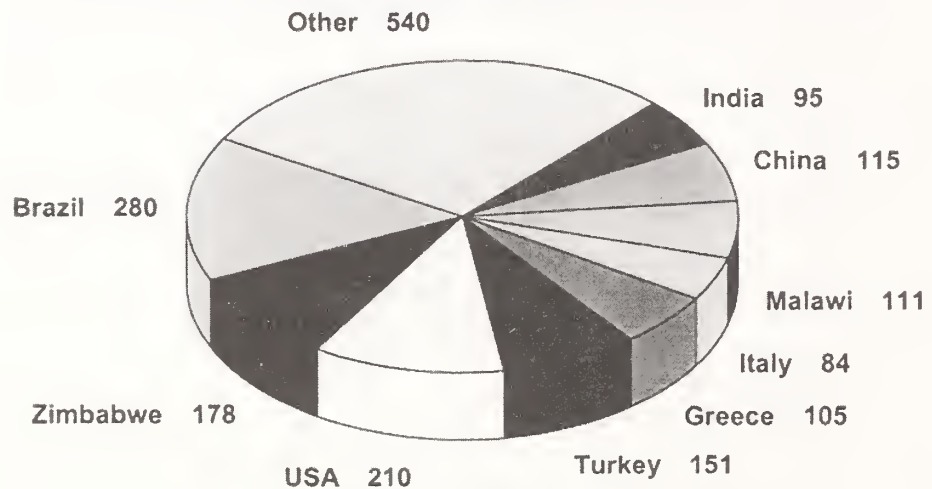


1998 TOBACCO EXPORTS



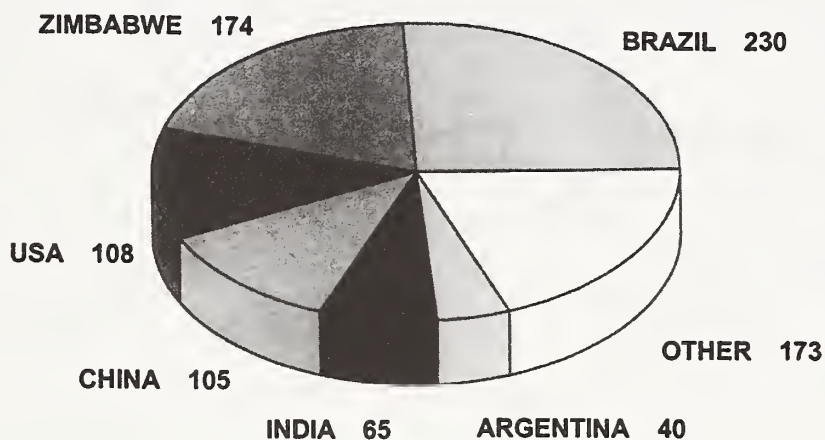
1.87 MIL. TONS

1998 WORLD TOBACCO EXPORTS



1.87MIL. TONS

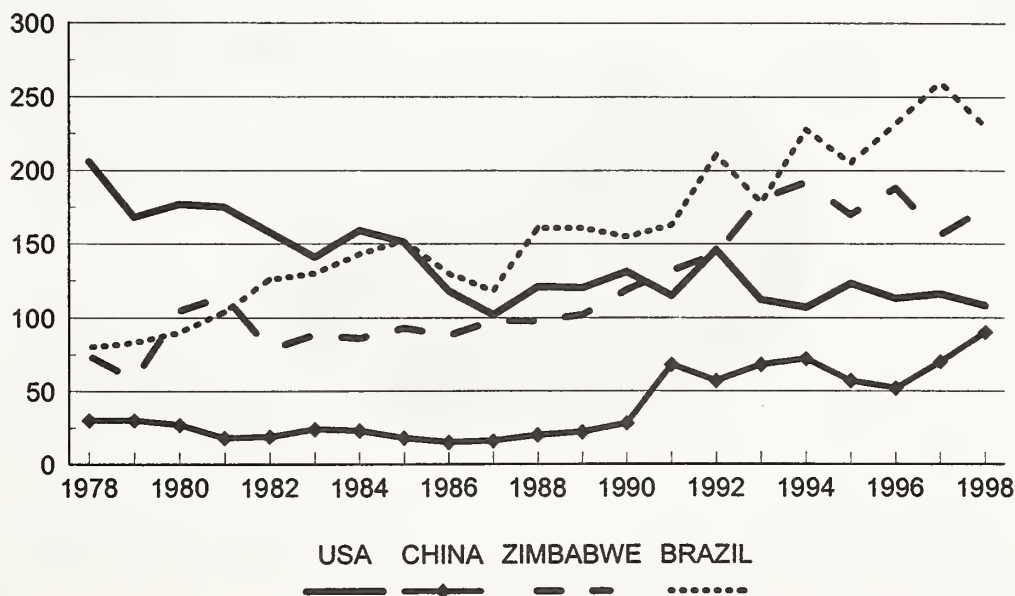
1998 FLUE-CURED EXPORTS



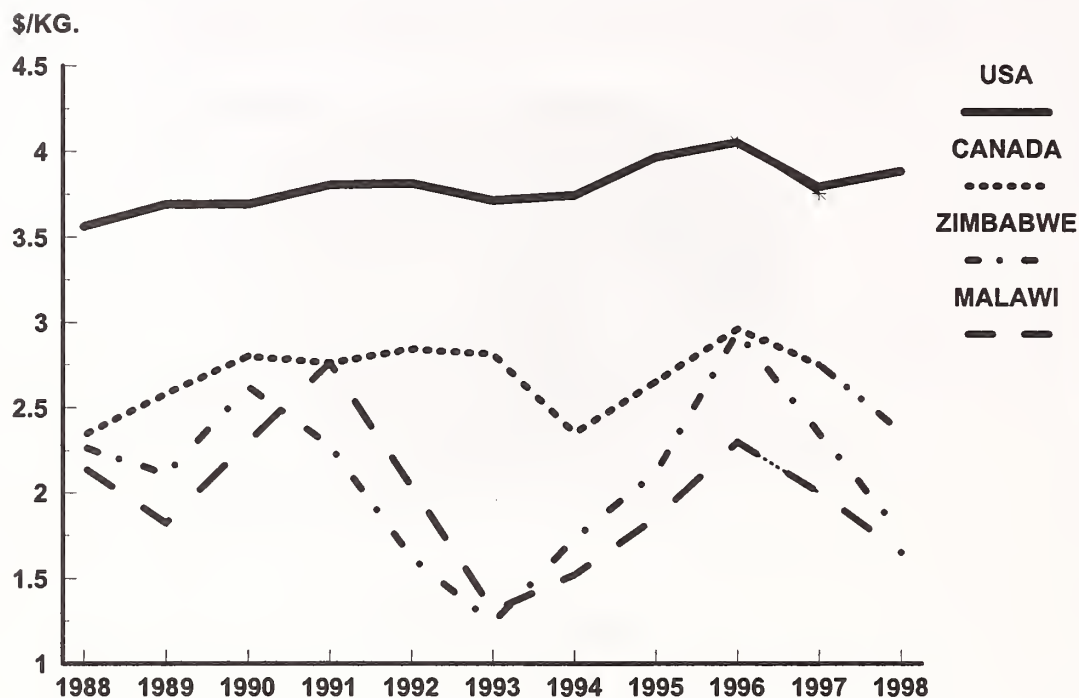
895,000 TONS

FLUE-CURED EXPORTS

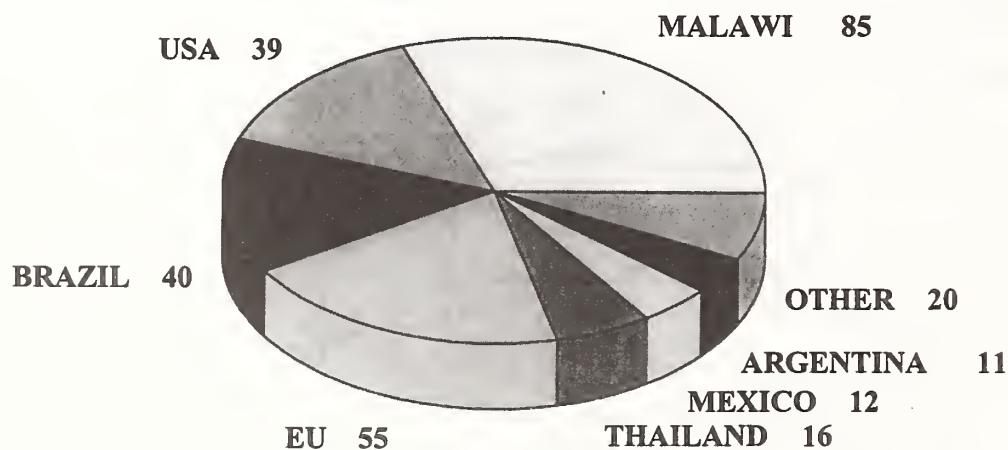
1,000 tons



FLUE-CURED GROWER PRICES

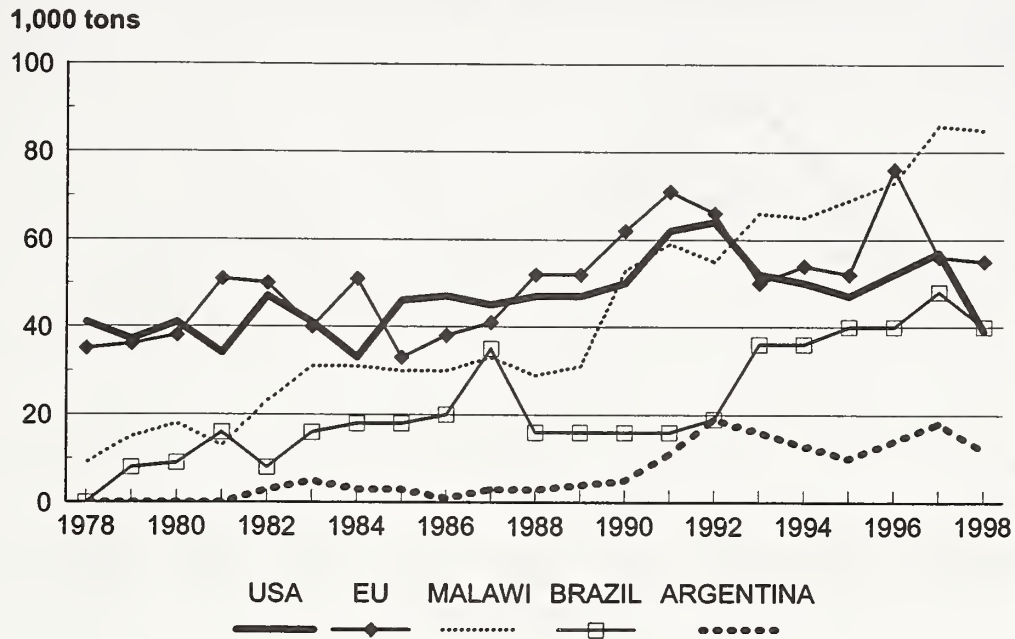


1998 BURLEY EXPORTS

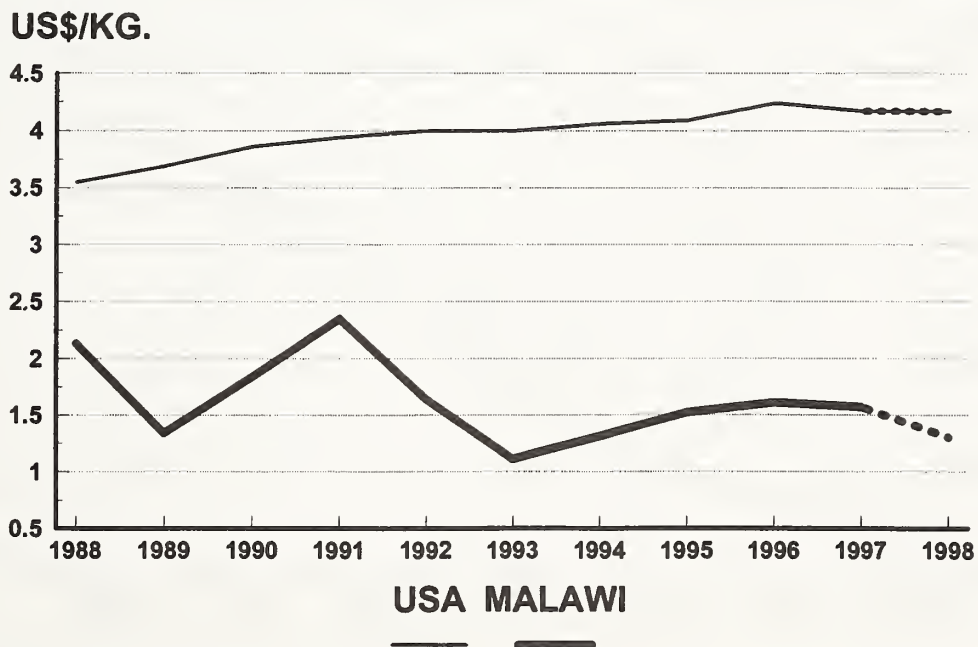


313,000 TONS

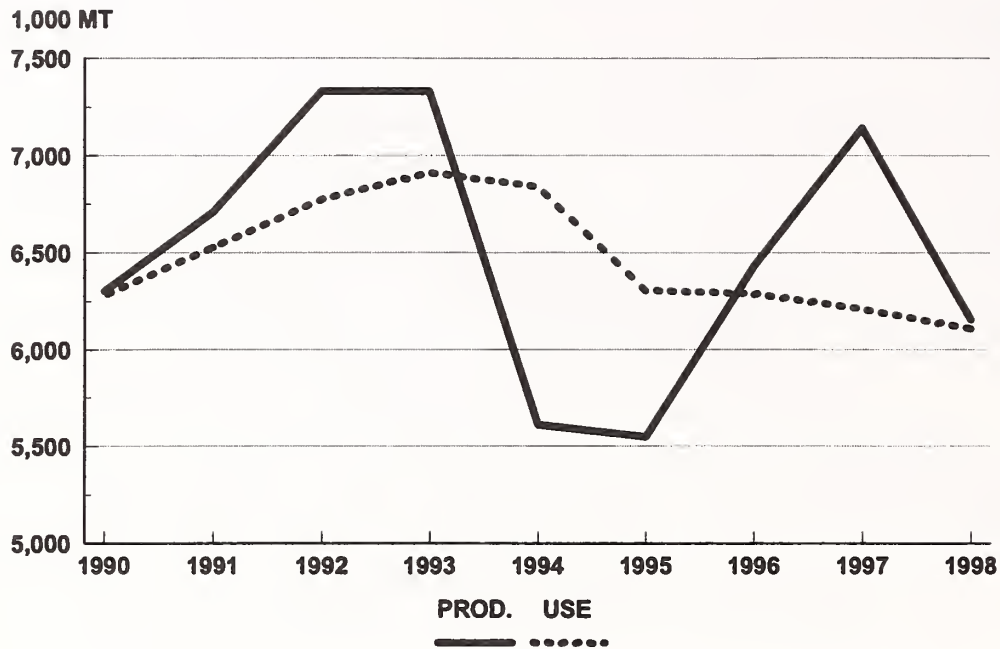
BURLEY EXPORTS



WORLD BURLEY PRICES

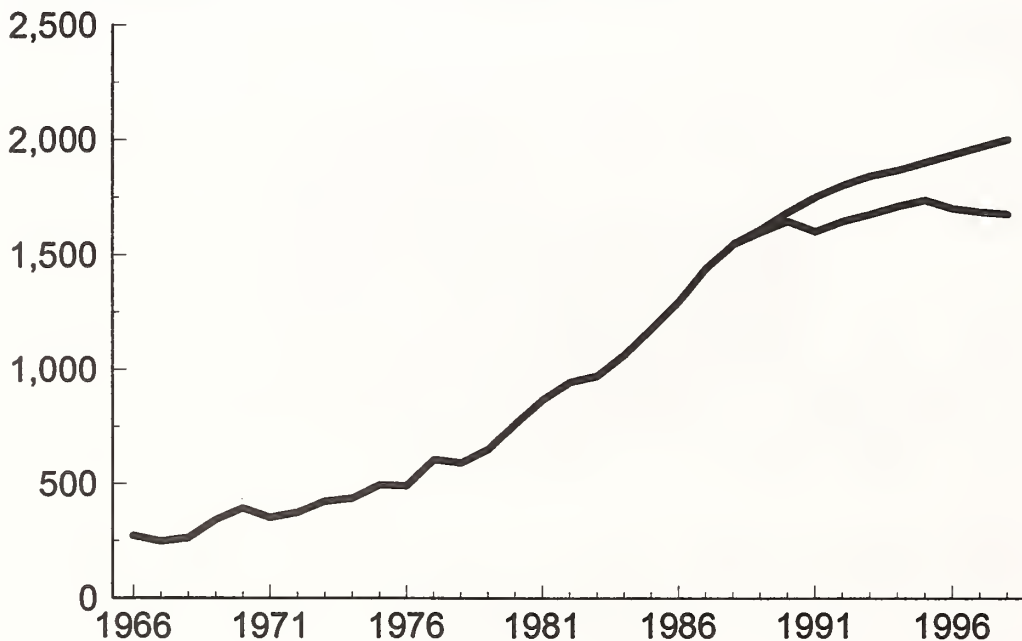


WORLD TOBACCO PRODUCTION vs. USE

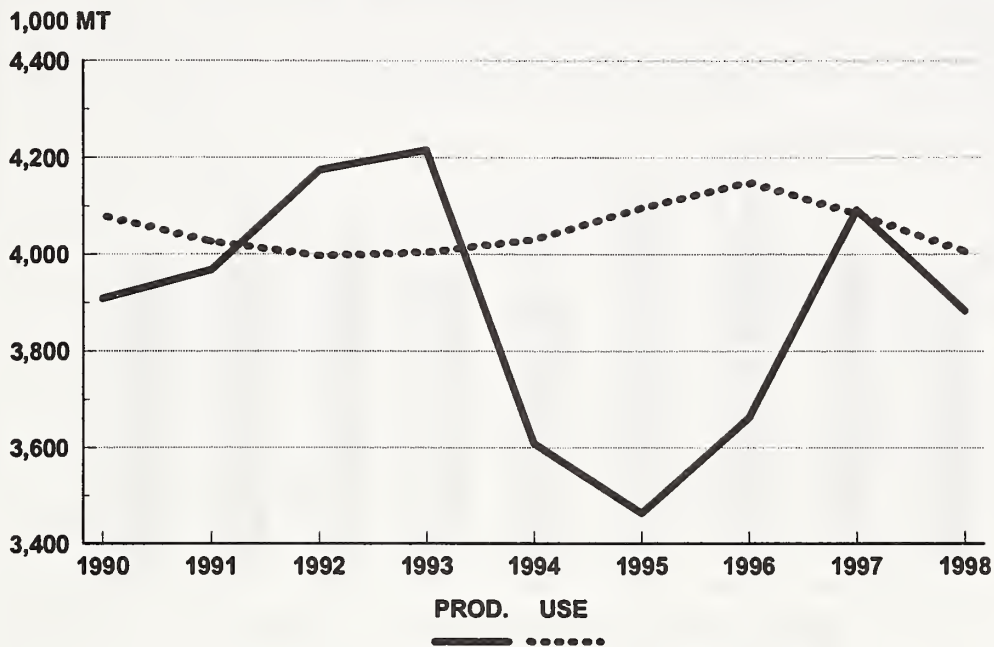


Chinese Cigarette Production

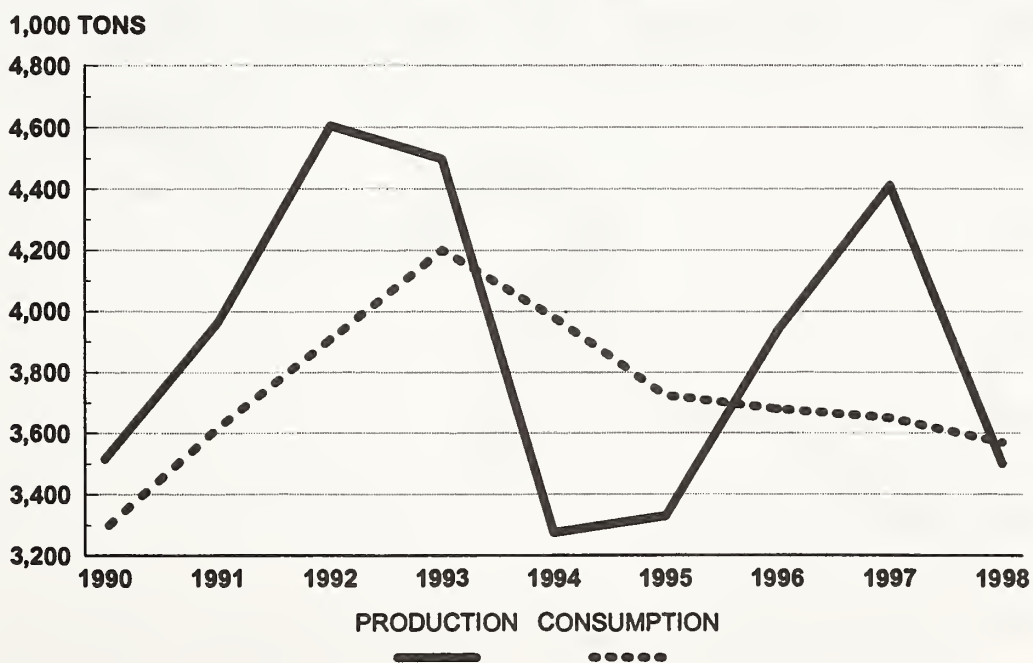
billion pieces



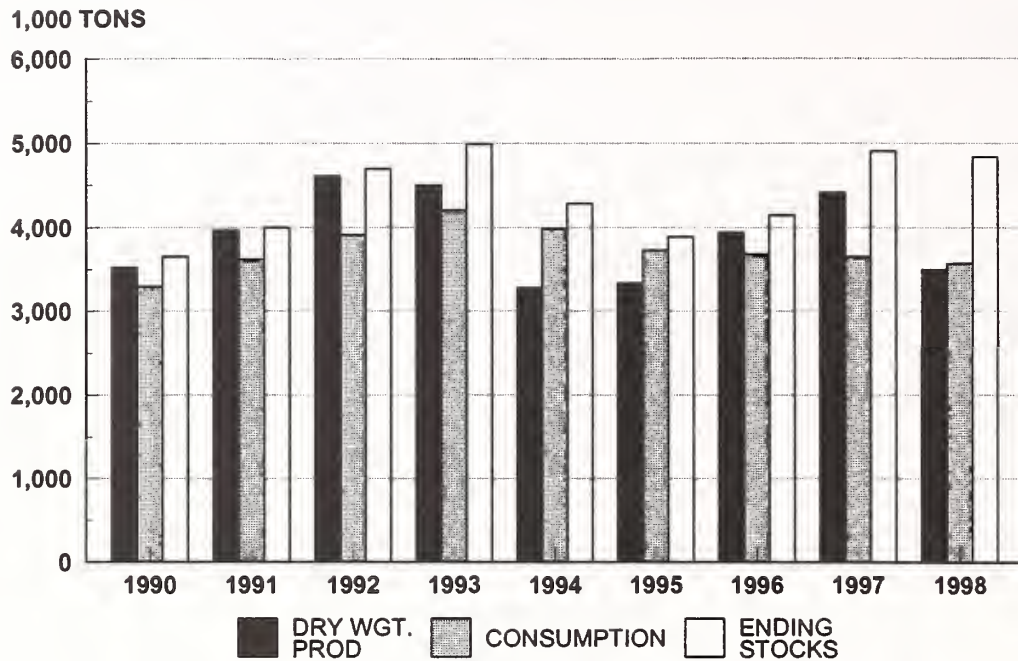
WORLD TOBACCO PROD. vs USE (ex PRC)



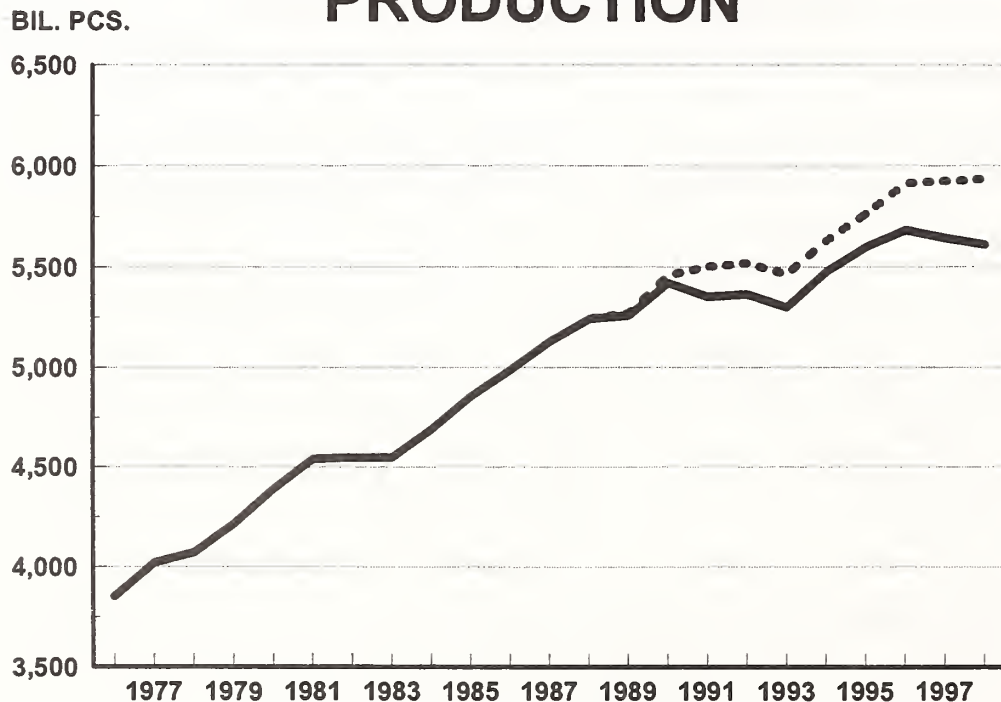
WORLD FLUE-CURED PRODUCTION & USE



WORLD FLUE-CURED PRODUCTION & USE

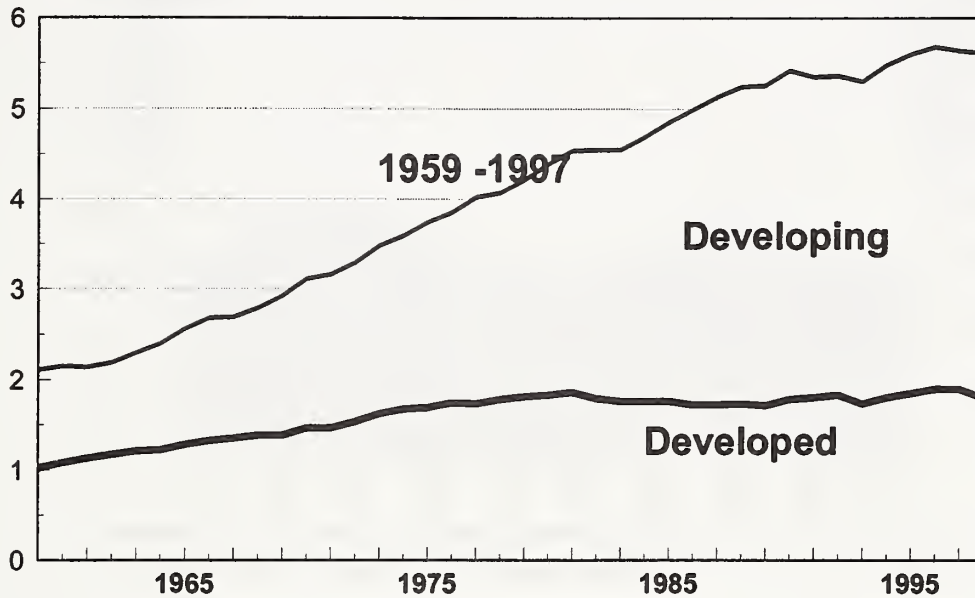


WORLD CIGARETTE PRODUCTION



WORLD CIGARETTE PRODUCTION

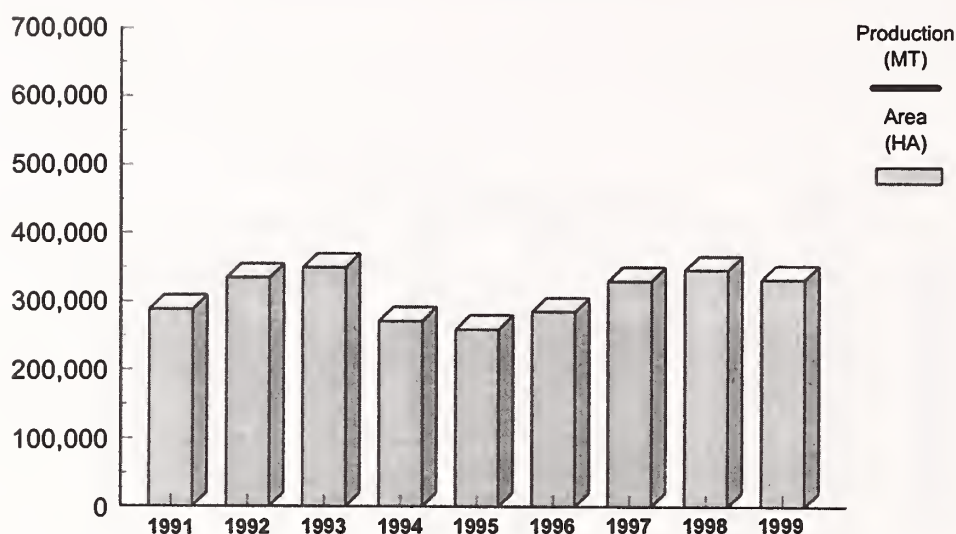
Tril. Pcs.



1999 Outlook -- Where will we be at year's end?

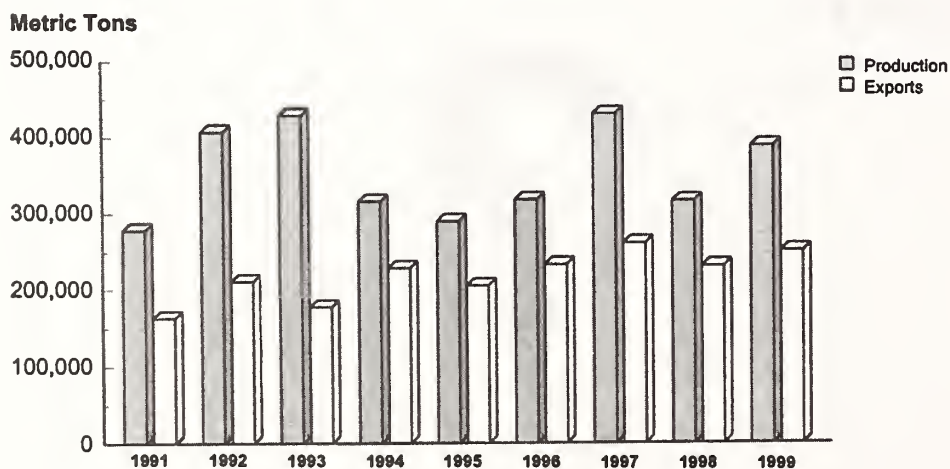


Brazil: Area Planted and Production



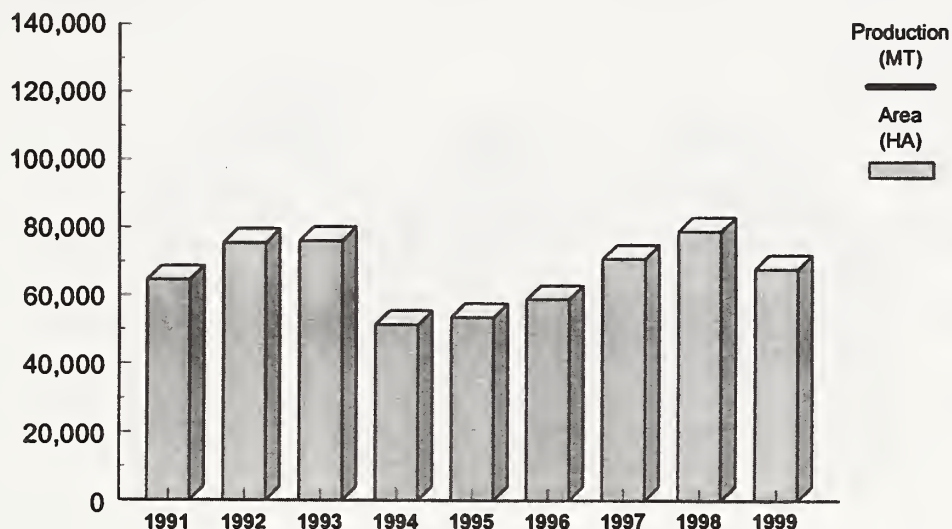
- 1999 production forecast to increase 17 percent.
- Yields are expected to return to normal levels.

Brazil: Flue-Cured Production and Trade



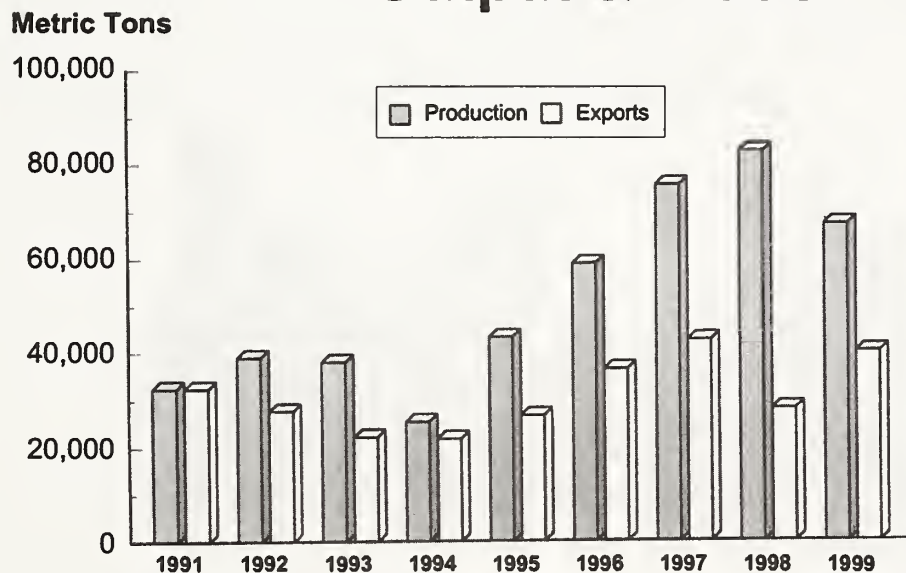
- Crop expected to increase 23 percent.
- Exports Likely to reach 250,000 Tons.

Argentina: Area & Production



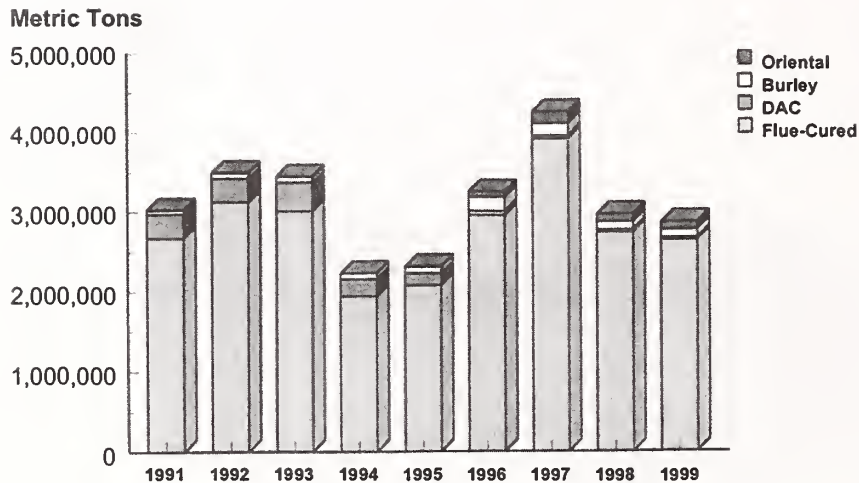
- 1999 production is forecast to rebound to 120,000 mt.
- Flue-cured output will fall and dark & burley increase.

Argentina: Flue-cured Output & Trade



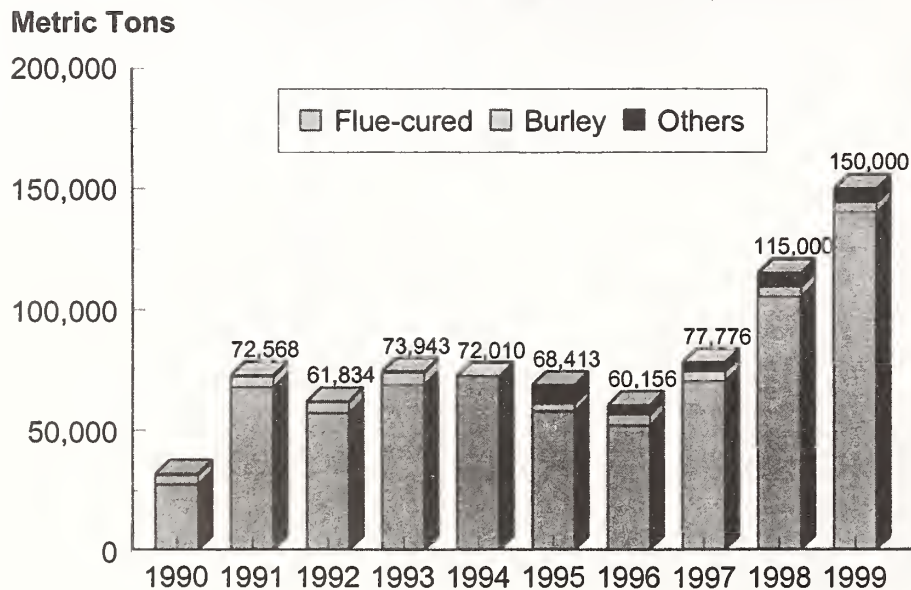
- Crop expected to decline 19 percent.
- Exports Likely to reach 40,000 tons.

China: Leaf Output by Type



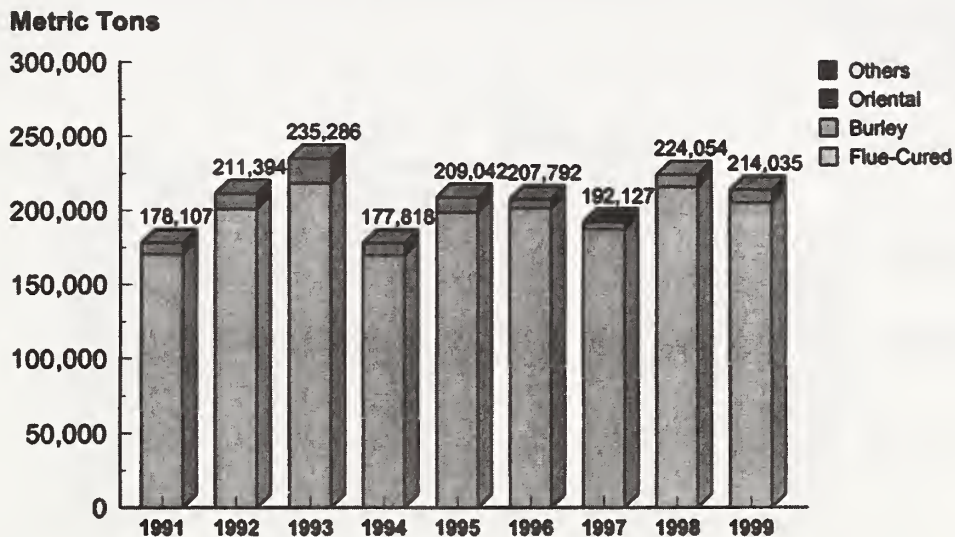
- Flue-Cured Output Forecast to Fall slightly.
- Gov't Plan is to balance production and use in 3 yrs.

CHINA'S Leaf Exports



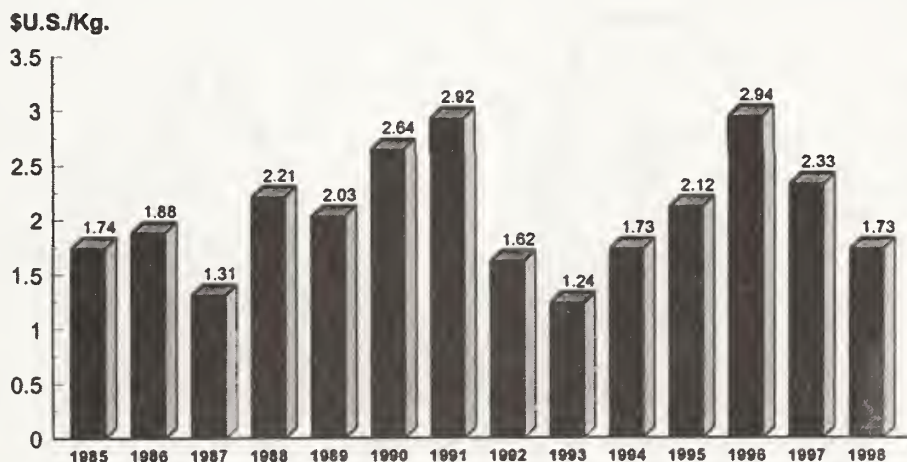
- Gov't Expects Exports to Reach 200,000 Tons by 2000.
- VAT reduced to stimulate exports of leaf & cigarettes.

Zimbabwe: Leaf Production



- Flue-cured output may fall slightly.
- Prices in 1998 were off 40 percent in U.S. dollar terms.

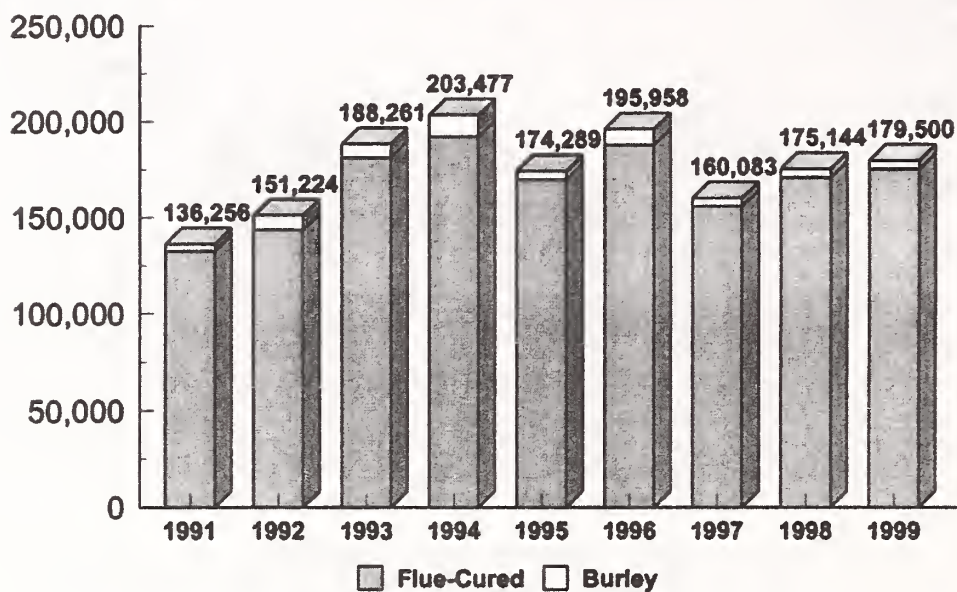
Zimbabwe: Flue-Cured Grower Prices



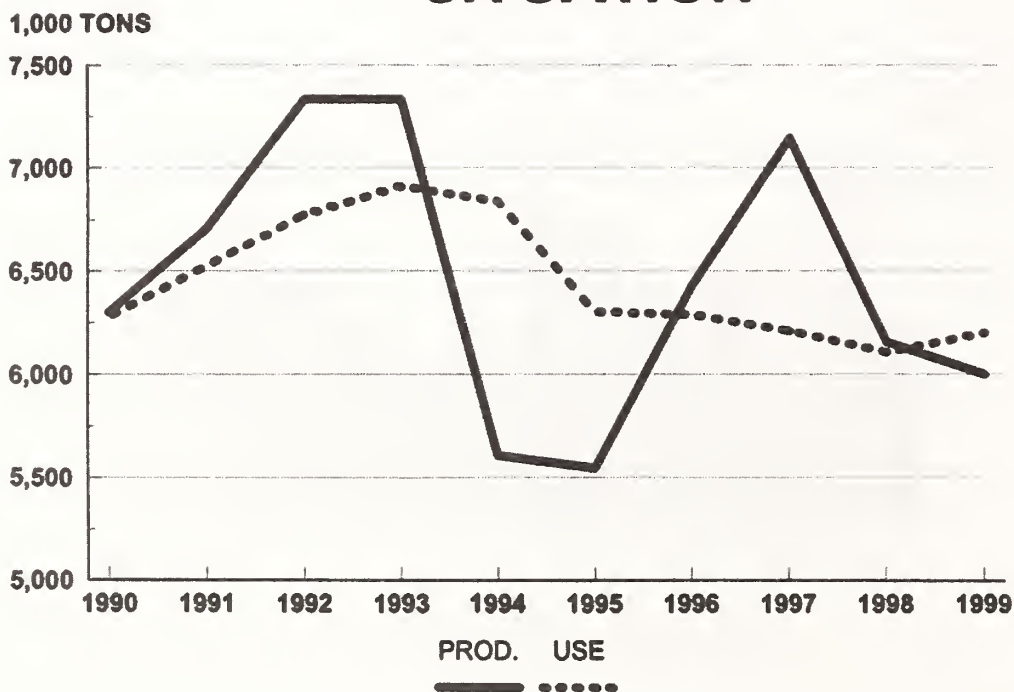
- Quality and World Stock Factors Push Price Down in 1998.
- Growers have been encouraged to improve quality in 1999.

Zimbabwe: Leaf Exports

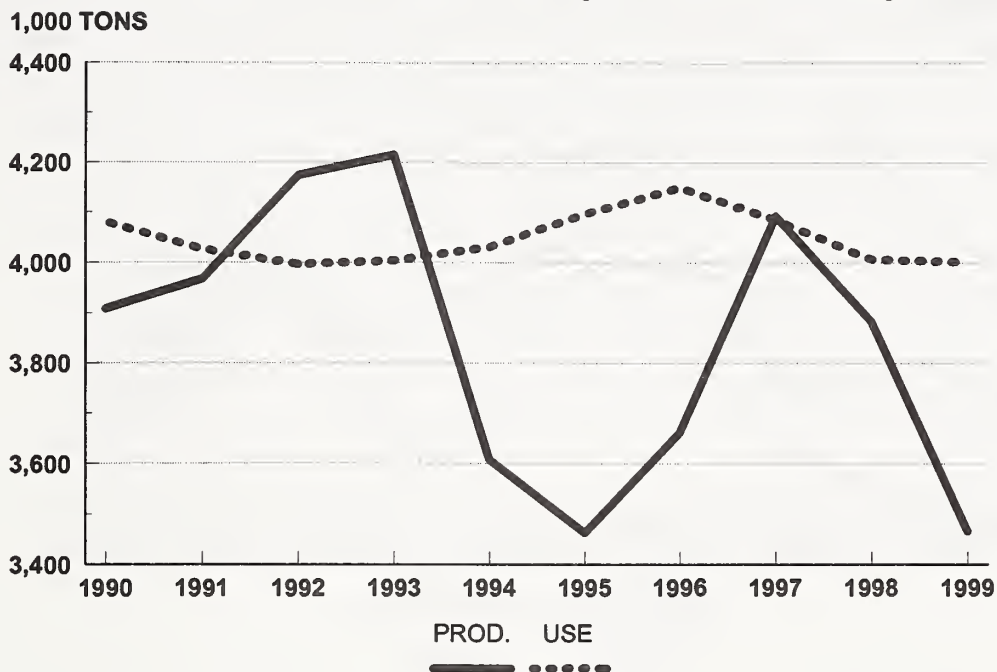
Metric Tons



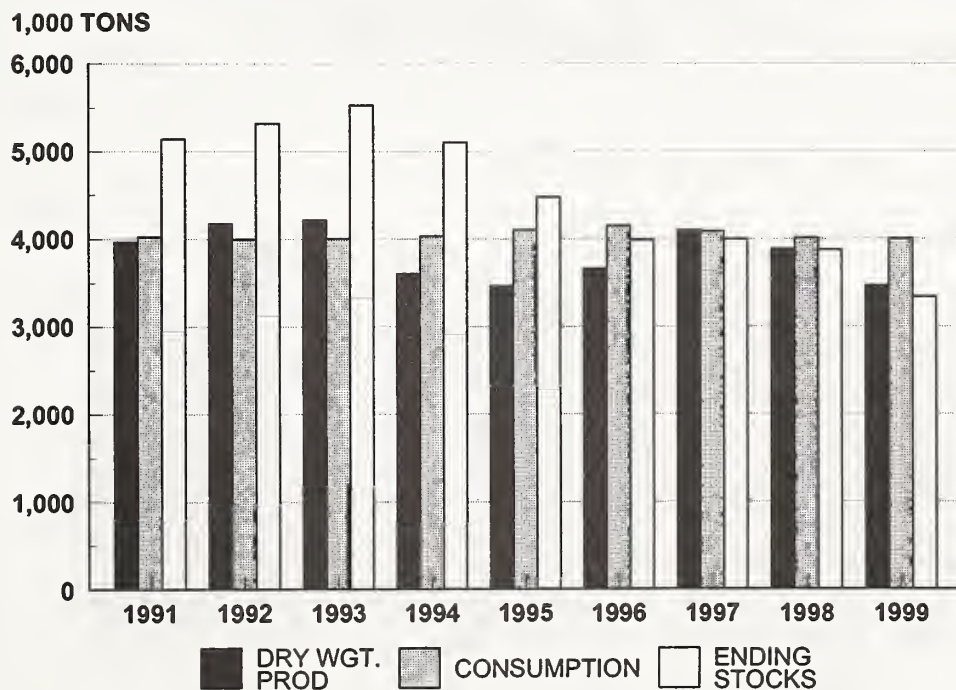
WORLD TOBACCO SITUATION



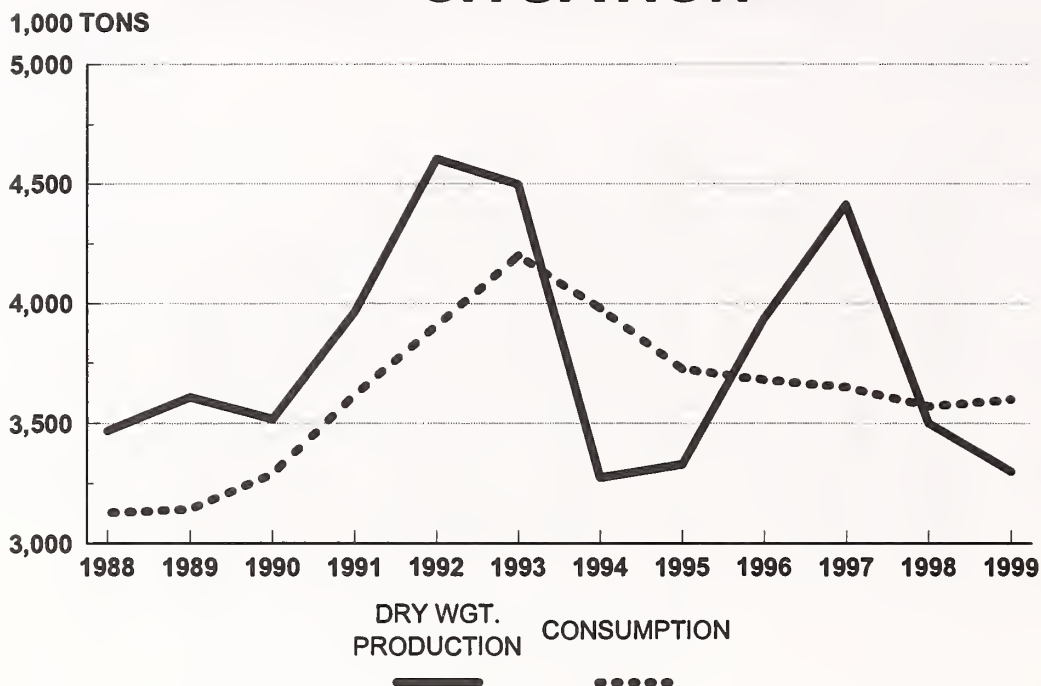
WORLD TOBACCO SITUATION (Ex-China)



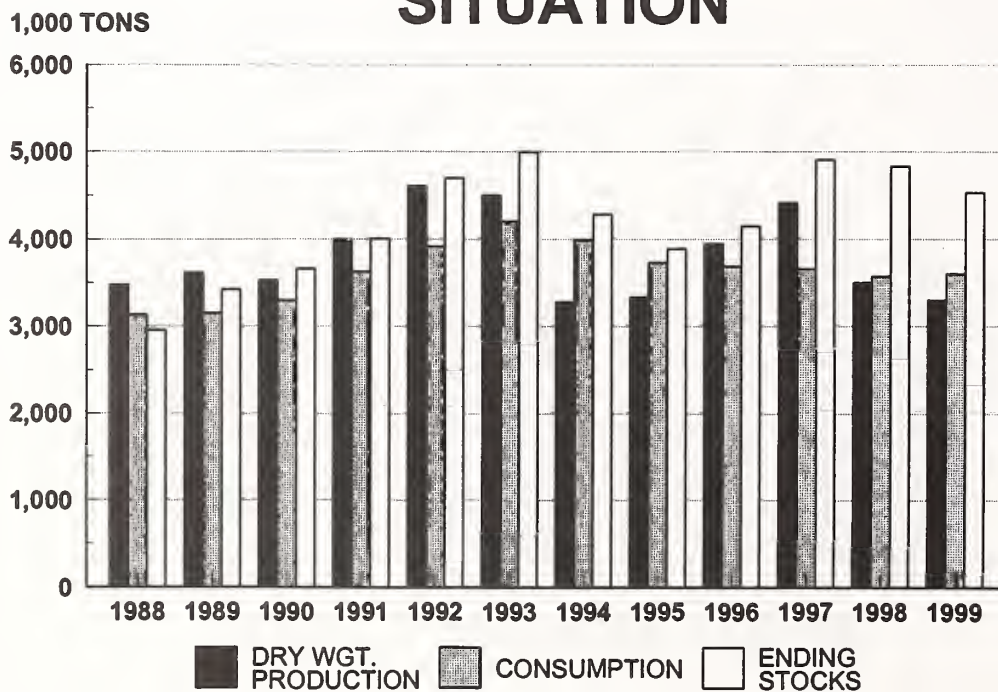
WORLD SITUATION (Ex-China)



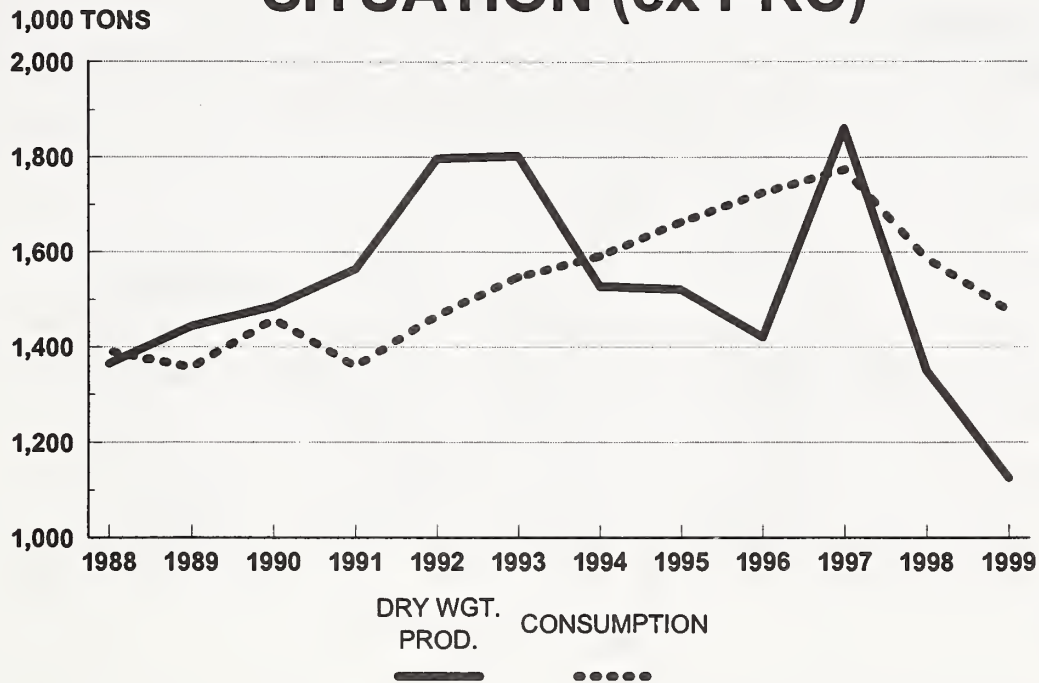
WORLD FLUE-CURED SITUATION



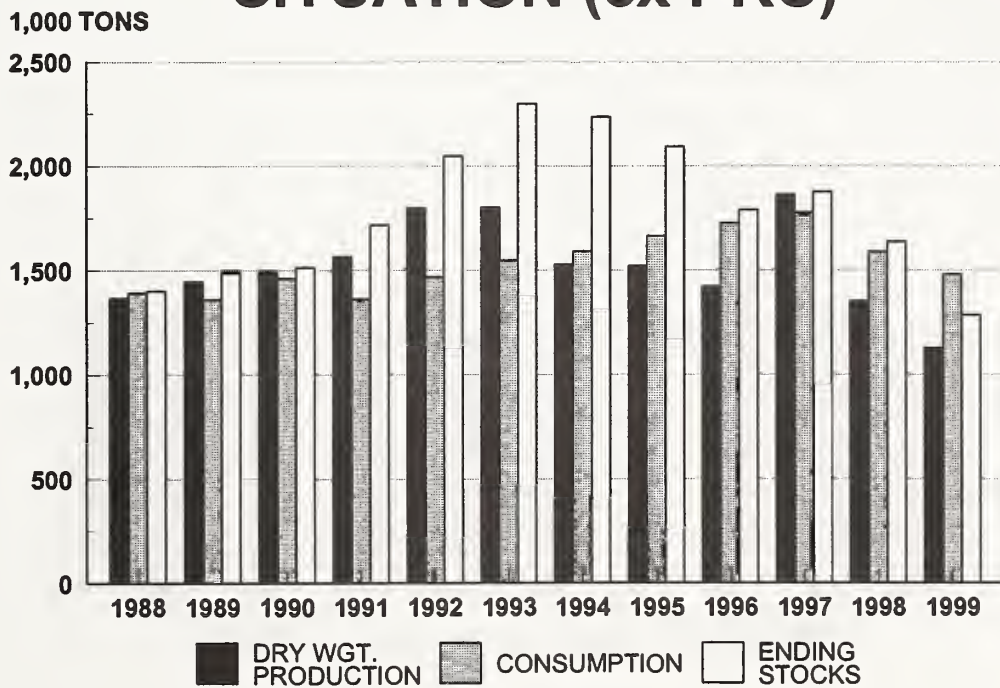
WORLD FLUE-CURED SITUATION



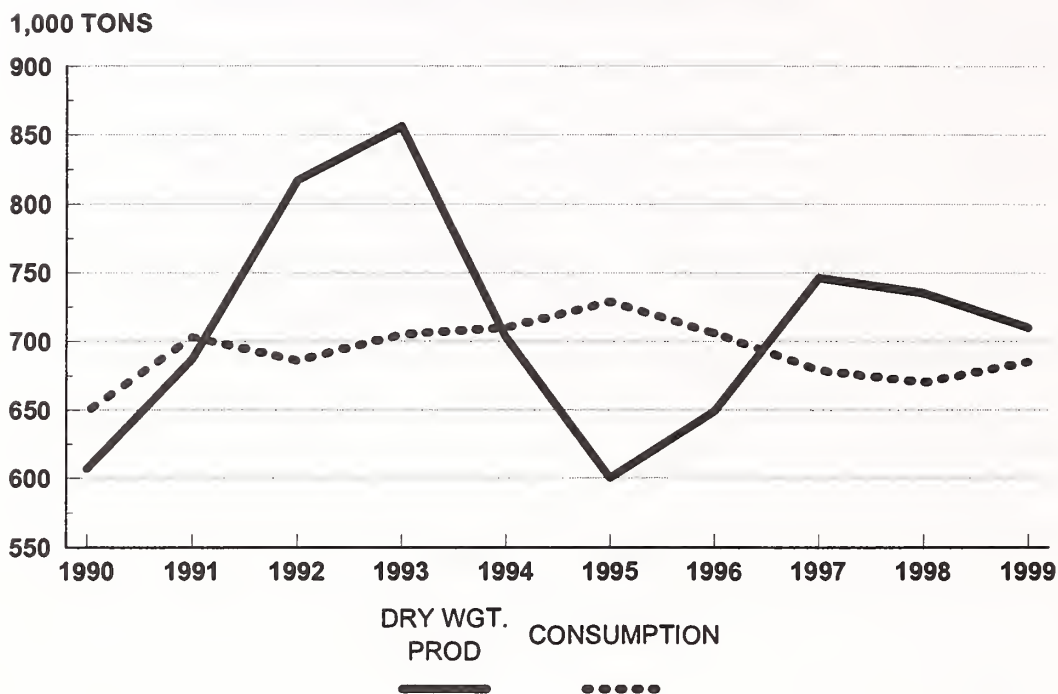
WORLD FLUE-CURED SITUATION (ex PRC)



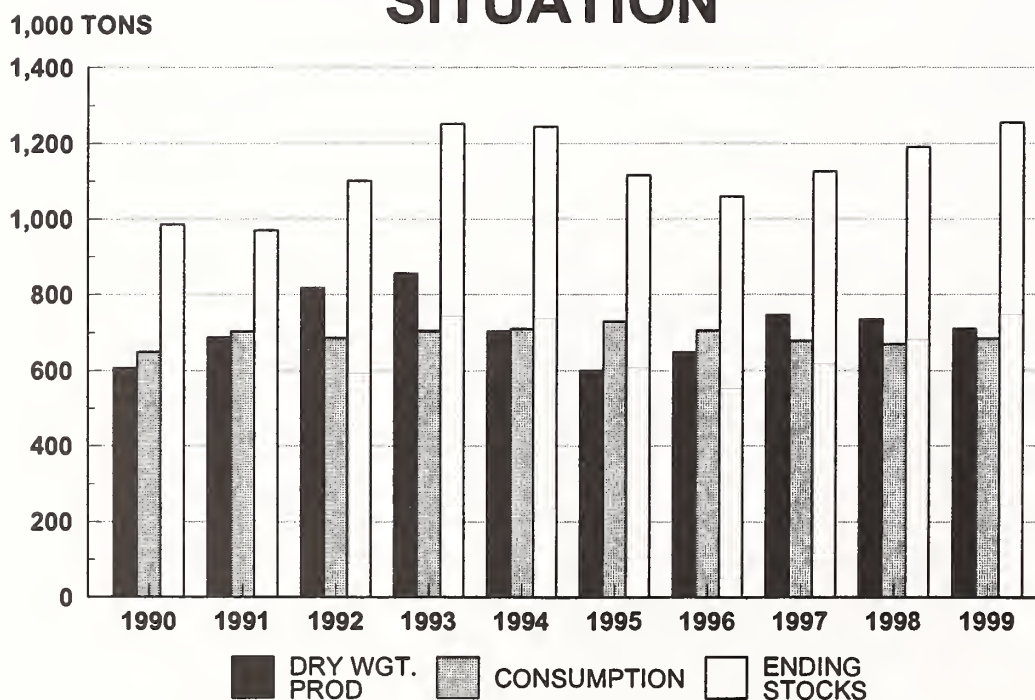
WORLD FLUE-CURED SITUATION (ex PRC)



WORLD BURLEY SITUATION



WORLD BURLEY SITUATION



FLUE-CURED TOBACCO PRODUCTION

Select Countries 1998 & proj. 1999
(metric tons)

	<u>1998</u>	<u>1999</u>	<u>Change</u>	
Argentina	82,400	65,000	(17,400)	
Zimbabwe	215,914	200,000	(15,914)	
Brazil	315,000	385,000	70,000	
China	2,674,000	2,594,020	(79,980)	???
U.S.	370,000	295,000	(75,000)	
India	171,000	160,000	(11,000)	
Tanzania	<u>35,000</u>	<u>28,000</u>	<u>(7,000)</u>	
Subtotal	3,863,314	3,727,020	(136,294)	

BURLEY TOBACCO PRODUCTION

Select Countries 1998 & proj. 1999
(metric tons)

	<u>1998</u>	<u>1999</u>	<u>Change</u>
Argentina	29	37	-6
Malawi	114	118	+4
Brazil	84	86	+2
China	72	65	--
U.S.	276	270	-6
Mexico	36	30	-2
EU	84	82	+2
Thailand	<u>41</u>	<u>43</u>	<u>+8</u>
Subtotal	736	731	-5

The Future of U.S. Leaf Exports
Presented by
James H. Starkey, Senior Vice President, Universal Leaf Tobacco Company, Inc.

My assignment today is to talk about the future of U. S. leaf exports. It is particularly appropriate that this meeting is being held in Crystal City so that perhaps someone can go outside and find a crystal ball that will help determine exactly what the future is. The past is the prologue to the future and it might be helpful to look at some trends. The first chart (Figure 1) shows U. S. flue cured exports starting from 1989 through the most recent year. We did not pick 1989 for any particular reason. We just started at that point in time because in order to have a 10-year historical trend which could be used to project the future out over the next 10 years. And, looking only at the past, the 10-year trend shows a decline of 2.3% a year in flue cured exports since 1989. However, more recently over the last three years, the decline has been 12.34% per year.

Burley is somewhat different. (Figure 2) Over the 10-year period, exports essentially have been flat. Or to be exact, the decline has been about ½% per year. Over the last three years, the decline in burley exports has been 14.4% per year.

Well, what has been going on? In the last 12 months, much of the decline in exports is due to the impact of financial and economic turmoil in Southeast Asia and the former Soviet Union. I think we have seen this directly in the impact on U. S. exports of leaf to places like Thailand and Korea and indirectly in terms of a decline in leaf exports to foreign manufacturers who may be located in Europe and other areas of the world and who were selling export cigarettes in Southeast Asia and the former Soviet Union. Exports of cigarettes to those areas have declined fairly sharply in the last 12 months.

Another development that is probably of more concern is a continuation of the slow movement away from U. S. leaf through gradual adjustments in cigarette blends and the substitution of non-U. S. leaf in those blends. This probably has been more pronounced in the case of flue cured tobacco than for burley. This reflects the fact that it is much more difficult to produce burley of acceptable quality for premium style cigarettes in other countries than it is to produce acceptable quality flue cured tobacco. The reason is good weather is not only needed during the growing cycle to produce quality burley but the right blend of weather and humidity is also needed during the curing cycle. U. S. conditions appear to be unique in this regard and there are very few countries outside the U. S. where superior quality burley can be produced. However, quality in Brazil is improving rapidly.

And, finally, after reviewing what U. S. leaf customers have been purchasing over the last few years and talking to many of them, I have come to

the troubling conclusion that no significant foreign user of U. S. leaf plans to use more in the future. This is not good news. It has significant, albeit negative, implications for future exports of U. S. leaf, particularly for flue cured leaf. This can be seen by projecting the export trends out 10 years using Figures 1 and 2. If the 10-year trend is accurate, flue cured exports will decline from the current level of 340 million pounds to 274 million pounds in 2007. Projecting on the basis of the 3-year trend would indicate a drop in flue cured exports from 340 million pounds to 110 million pounds, a decline of two thirds.

Looking at burley, the same analysis, yields a somewhat different conclusion. Using the 10-year trend, the decline in burley would be insignificant over the next 10-year period. However, if in fact the more recent three-year period is more symptomatic of the future, a more significant decline over the 10-year period from the current level of 180 million pounds down to about 48 million pounds could occur.

Will either of these scenarios happen? Probably not. Yet, what factors can be seen on the horizon that are likely to reverse the trends, whatever their magnitude?

Customers for tobacco are looking for three things when they shop for leaf around the world: quality, availability, and price. The number one consideration is leaf quality. Superior quality helps explain why foreign manufacturers are still buying U. S. tobacco even though it costs significantly more than leaf from other countries. The second thing that customers are seeking is availability of supply. Or, to explain this differently, customers are looking for selectivity—the ability to get the styles of tobacco that they need from a particular origin. The third factor is price. Now, let's look at these three things separately.

Foreign manufacturers buy U. S. leaf because of the intrinsic smoking quality of that leaf, or, in layman's terms, the flavor that is imparted to the cigarette by U. S. leaf. I do not know what causes this superior flavor. It is probably a unique combination of factors which include land, climate, technology, and the knowledge and expertise of U. S. growers who have been growing tobacco for many years. However, the combination of these factors in the U. S. yields a quality of flue cured and burley tobacco that thus far no one else in the world has been able to duplicate.

As I mentioned earlier, these foreign manufacturers are still prepared to pay a premium for U. S. leaf quality over competitive growths. What are these competitive growths? In the United States, manufacturers are comparing U. S. leaf primarily against Brazilian. In Europe, U. S. leaf is confused primarily with Zimbabwean. There is surprisingly very little cross competition between Zimbabwean and Brazilian leaf. There is a core demand in Europe for Zimbabwean leaf and there is a core demand in the United States for Brazilian.

Whatever competition exists between Zimbabwe and Brazil is at the margins and not significant in most years.

For many years foreign customers who have come to the U. S. market have complained about the high price of U. S. leaf. They have also complained about the poor presentation of the leaf in our markets. By this they mean the mixing of stalk positions and types as well as the quantity of foreign matter in the tobacco. They have complained about the cost of the marketing system -- that the U. S. auction system is the highest cost and most inefficient in the world. And finally, foreign manufacturers don't like the new flue cured bales. In fact, one of them has recently circulated a letter to all of the farm groups making that point in no uncertain terms.

So my question with respect to quality is whether any constructive changes will occur to resolve any of these problem areas anytime in the near future?

The second factor, availability, has two dimensions. First, the U. S. has been seen up to now as a reliable supplier of tobacco in the world market. There are a couple of reasons for that. One, we have a demand-based price support program that is designed to produce the tobacco necessary to meet U. S. domestic and export requirements. Two, since U. S. flue cured and burley are grown over fairly wide areas, the crop risk is diversified so that a complete crop failure is unlikely. Unfortunately, this is less true of burley where crops in the last three years have been much smaller than anticipated because of weather and disease problems. However, generally, relative to other parts of the world, where production is much more concentrated, the U. S. crop risk is much more diversified.

Second, our large crops up to now have provided the selectivity that our export customers required in order to be able to obtain the qualities and styles of tobacco that they need. And if you follow the markets, you know that these export customers pay relatively higher prices to get these special qualities of tobacco. As crops increase in size, the probability of there being more of the export styles of tobacco available also increases. However, I think that U. S. crops are going to be smaller in the future which means that the availability of the export style tobacco will also decline. This is shown in the following analysis.

This methodology takes a little explaining. We tried to estimate future demand for U. S. flue cured and burley leaf assuming a decline in U. S. cigarette consumption of 4% annually. (Figure 3). Now, I have not the slightest idea what the actual rate of decline is going to be. The economists in the group would calculate that the price increases which were implemented recently following the settlement of tobacco litigation with the states should reduce cigarette domestic consumption by 10 to 12 percent (the elasticity is 0.4). So far that has not

happened. However, a number of things have been taking place in the U. S. cigarette market which have probably obscured the eventual impact. This includes loading or the movement of product into the distribution channels ahead of the price increases. And, there also has been extensive couponing by U. S. manufacturers as well as other programs designed to mitigate the price increases and maintain market share. So for purpose of this exercise, I just assumed conservatively was that there would be an on-going consumption decline of 4 percent.

I also assumed for the base case that imports would stay constant at the current level of about 300 million pounds (of which 200 million pounds or two thirds is flue cured) and that cigarette exports would also stay constant. The same assumptions were used for burley as a prelude to combining the two charts to attempt to show what would happen to overall leaf demand with a 4 percent decline in cigarette consumption and a modest decline in exports based on the 10-year historical trends. Under this scenario, the demand for flue cured leaf would decline by about 200 million pounds over the next 10 years which is more than 25% (Figure 4). However, projecting on the basis of the more recent three-year trends creates a much more sobering picture as seen in Figures 6 and 7. For burley, there is a similar picture...not quite as dramatic... because the historical trend for burley exports has been flatter. However, burley requirements would decline by a 110 million pounds over the 10-year period. (Figure 5).

We held cigarette exports and leaf imports constant over the period for purpose of this analysis. I do not believe that either of these assumptions is realistic. Cigarette exports have already declined this year to 205 billion pieces from the 1997 peak of about 240 billion pieces and my expectation is that over the next 10 years there likely will be further declines. Holding imports constant at 300 million pounds assumes that the tariff rate quotas will continue to be utilized at about 50% of the total available. This too would appear unrealistic if one assumes that manufacturers are going to be facing strong pressures to reduce input costs including leaf costs in order to maintain profitability. If true, this would suggest that more tobacco will be imported in the future than there has been in the recent past. So, what is shown here in terms of flue cured use going down 25% and burley use going down about 20% over the next 10 years is probably serendipity. Being honest with myself and with you, I would say that leaf use is probably going to decline by significantly more than these percentages over the next 10 years.

Finally, let me just mention price. As stated earlier, the U. S. produces the highest quality tobacco in the world and sells at a significant premium to competitive leaf. This happens primarily because the U. S. price support system has maintained U. S. market prices artificially above world levels. High prices are maintained by restricting supply through allotments and marketing quotas.

In the future, the gap between U. S. prices and prices in other tobacco producing areas of the world is likely to increase. One reason for this is the U. S. price will continue to escalate under the U. S. price support system. The increase is automatic, resulting from a legislative formula that adjusts prices to take into account changes in cost of production and changes in market prices.

At the same time, larger crops and lower costs in other areas of the world like Brazil and Zimbabwe have led to lower prices in those areas. Brazilian prices could drop even further as a result of the recent currency devaluation. Brazil's currency was overvalued by 25/30 percent. It is now floating freely and it has dropped sharply. The bottom line on prices is U. S. prices aren't going down and those in the rest of the world are. That means that the U. S. will become less competitive in the world market. Unfortunately there is little that can be done to remedy this situation without significant changes in the program.

In addition, the existence of significant unsold inventories held by the Stabilization pools and by the dealer trade exacerbates the near-term leaf supply. While uncommitted stocks are not as high as they were in 1993 when world leaf prices fell to very low levels, the combination of uncommitted stocks and anticipated 1999 leaf production suggests excess supplies of flue cured and burley leaf with relatively low world market prices.

At the same time, I think it is going to take a while to really get an accurate fix on the demand side of the equation. World tobacco utilization has been growing at about 1 percent annually. However, I suspect that last year instead of an increase, there was probably a decline in leaf utilization due to the impact on cigarette consumption of economic chaos in Southeast Asia and the problems in the former Soviet Union. This may have reduced cigarette production in those regions as well as cigarette exports to them. In addition, leaf demand will also be affected by the U. S. settlement and we do not know yet what the full impact of that will be. This suggests that leaf demand may continue to be soft for the short term, or at least until there is improvement in the economies of those areas. However, I think the long-term trend in leaf use is still up and expect world leaf usage to continue to grow around 1% annually. In addition, American blend consumption will probably continue to grow at an even higher rate once these important markets recover, which would be good news for U. S. burley.

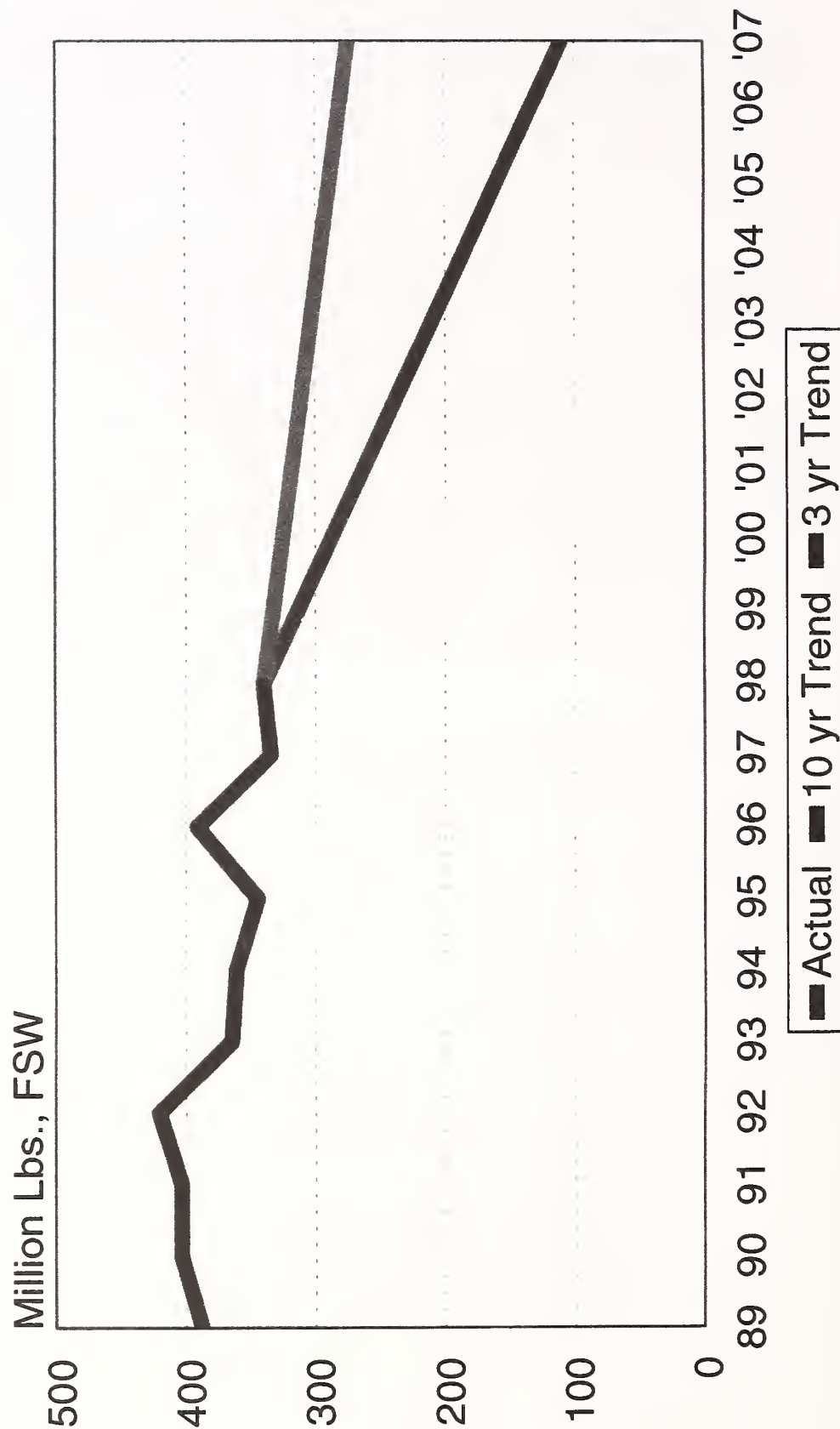
Is a reduction in U. S. prices to more competitive levels likely? Not without major changes in the tobacco program. So this suggests that U. S. leaf prices will continue to be forced up by the escalation of the price support formula and by the prospect of smaller crops in the United States resulting from both declining exports and declining domestic use.

Higher U. S. prices will in turn make U. S. leaf less attractive in export markets. Ironically, the higher prices and smaller crops will also force up lease payments (to rent quota) which will benefit the quota owners at the expense of commercial tobacco producers. Growers are beginning to understand the seriousness of the clouds on the horizon. However, even if there were a consensus among growers to make needed program changes (which there isn't at this time), the quota owners outnumber growers 2 to 1, and the quota owners are making out very well under the current system. This suggests that there is little likelihood that the tobacco program will be changed anytime soon. Even if a consensus for program changes existed, the risk of adverse Congressional action makes it highly unlikely that anyone would make the effort.

So without major changes or even the elimination of the tobacco program, I am pessimistic about the future of U. S. leaf exports. Our customers are looking for quality, they are looking for availability and they are looking for competitive prices. Unfortunately, all of the trends in the United States are in the wrong direction and I frankly don't see anything on the horizon that is likely to change these trends.

Figure 1

U.S. Flue Cured Exports



U.S. Burley Exports

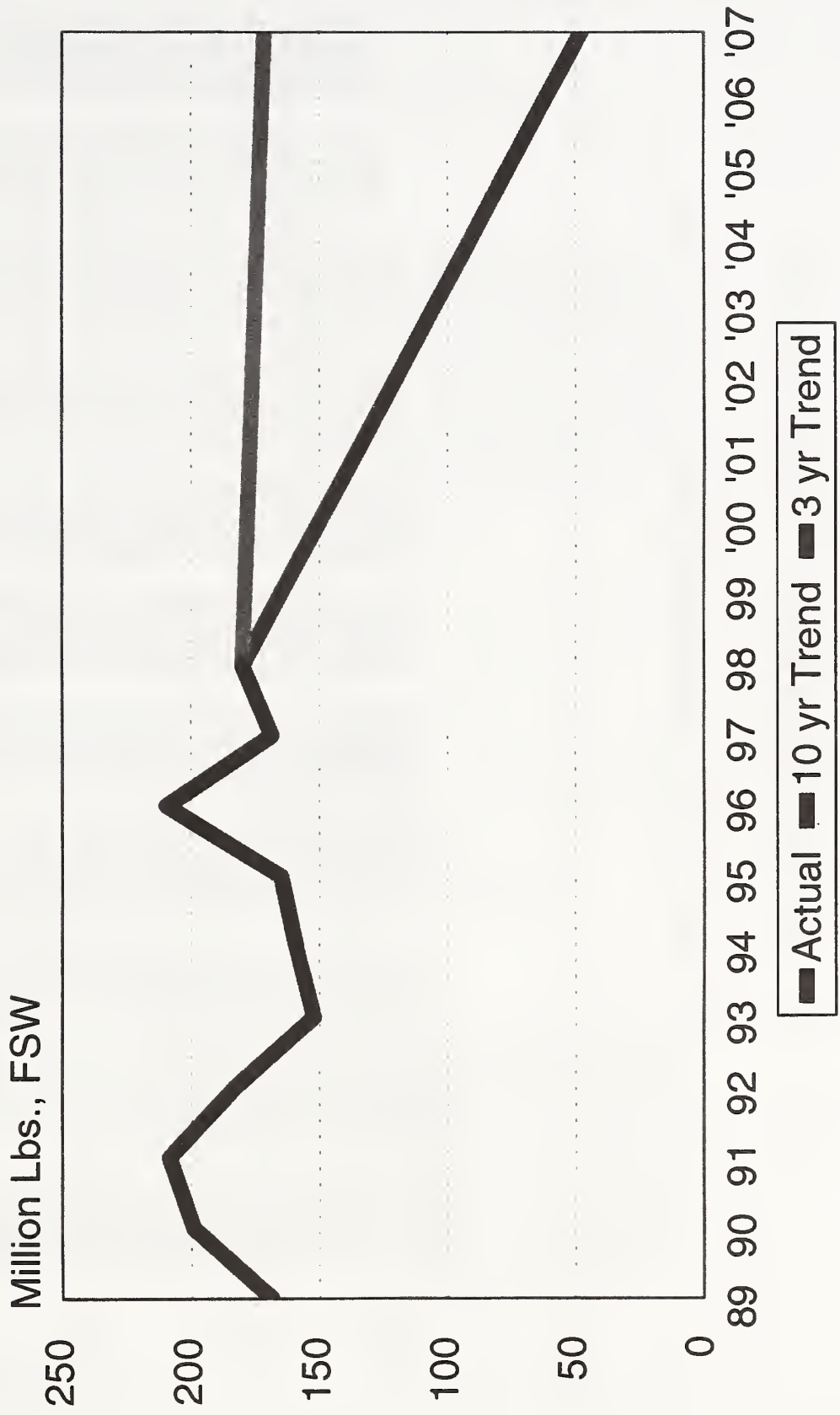


Figure 3

F. C. and Burley Demand

(4 % annual U.S. consumption decline)

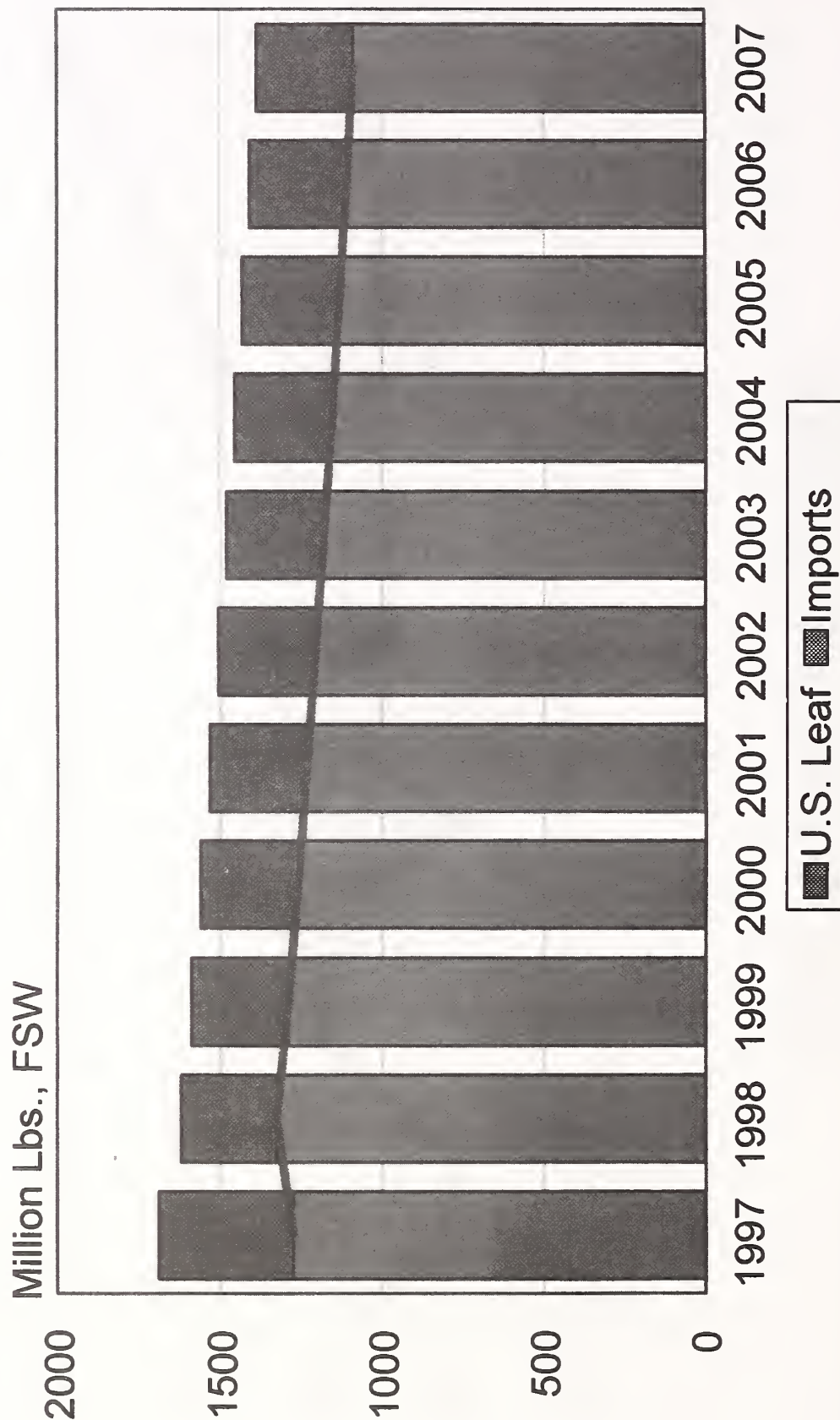


Figure 4

Flue Cured Demand

(4 % annual U.S. consumption decline)

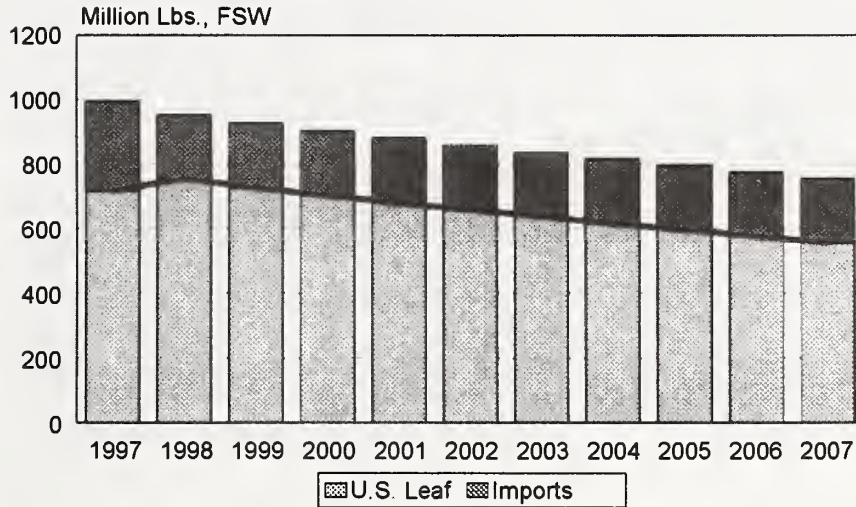


Figure 5

Burley Demand

(4 % annual U.S. consumption decline)

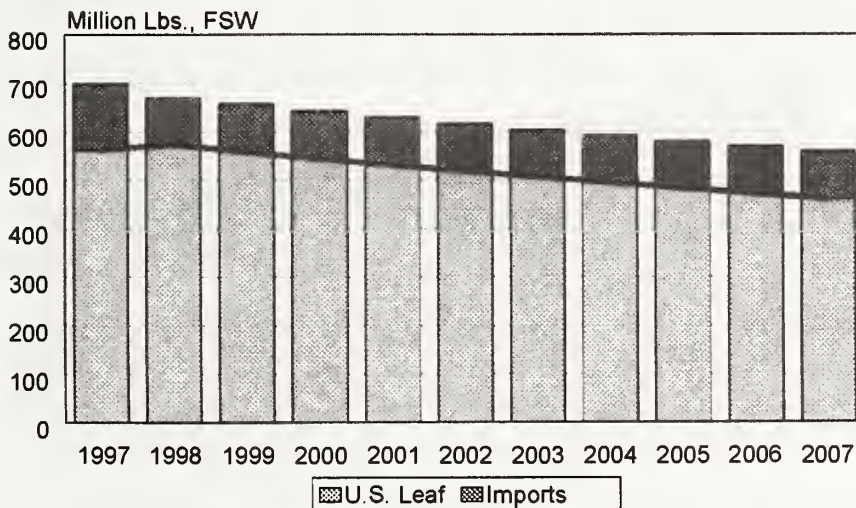


Figure 6

Flue Cured Demand

(4 % annual U.S. consumption decline)

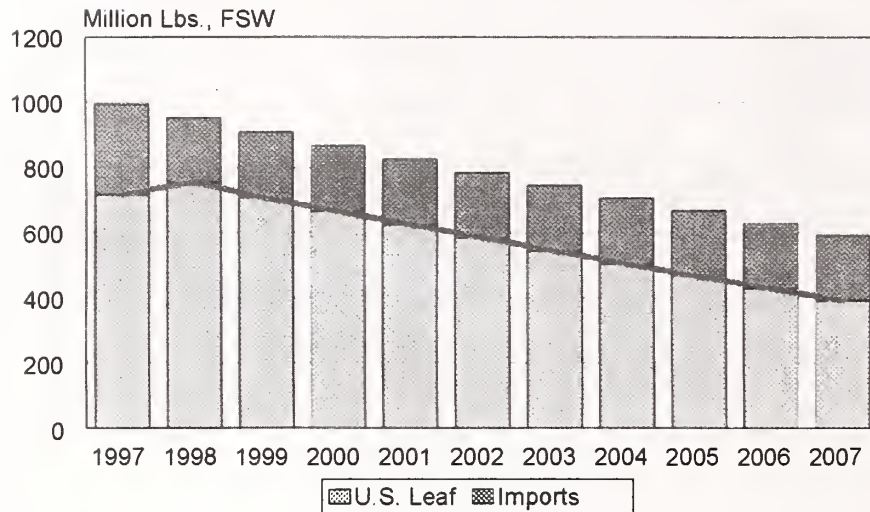
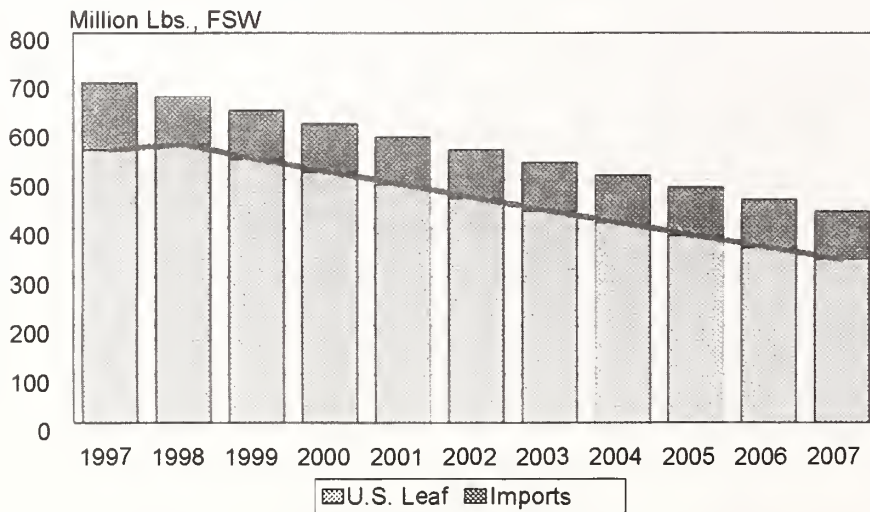


Figure 7

Burley Demand

(4 % annual U.S. consumption decline)





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